

RAC2 **EPA Region 2**



Final Construction Quality Assurance Plan

**Old Roosevelt Field Contaminated
Groundwater Area Site
Garden City, New York**

**EPA Contract No. EP-W-09-002
WA 023-RARA-02PE**

July 2010

**FINAL CONSTRUCTION QUALITY ASSURANCE PLAN
OLD ROOSEVELT FIELD CONTAMINATED GROUNDWATER AREA SITE
REMEDIAL ACTION
GARDEN CITY, NEW YORK
Work Assignment No.: 023-RARA-02PE**

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EPA Work Assignment No.	: 023-RARA-02PE
EPA Region	: 2
Contract No.	: EP-W-09-002
CDM Federal Programs Corporation	
Document No.	: 3320-023-00505
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Section 1

Introduction

1.1 Overview

This Construction Quality Assurance (CQA) Plan was prepared by CDM Federal Programs Corporation (CDM) for the U.S. Environmental Protection Agency (EPA) under the Remedial Action Contract (RAC 2) program, Work Assignment 023-RARA-02PE for the Old Roosevelt Field Contaminated Groundwater Area Superfund Site (the Site) in Garden City, New York. This CQA Plan has been developed as implementation of CDM's *Quality Management Process Manual No. 2 for Engineering Services During Construction* (QMP-2; CDM 2008) and corresponding *Construction Observation Guidelines for Project Representatives* (QMP-2A; CDM 2006) and follows guidelines presented in *Construction Quality Assurance for Hazardous Waste Land Disposal Facilities* (EPA 1986) for the construction of groundwater pump and treat system as part of remedial action (RA) at the site.

This CQA Plan introduces personnel, defines responsibilities, and details activities in CDM's quality assurance and quality control (QA/QC) program, such as inspections, testing, monitoring, audits, and corrective action for Phase I work, as defined in Section 1.2. The details regarding the QA/QC program for environmental/ chemical sampling and analysis work, and Phase II work as defined in Section 1.2 to be completed under this contract are presented in the Site Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) (CDM 2010).

The objective in developing and implementing the CQA Plan is to define the management system that will control and document:

- The quality of the techniques, materials, and equipment used in the project to ensure that they meet contract specifications and applicable EPA standards
- The timeliness of performance through integration of quality functions within routine project schedules
- The framework for communicating the quality control procedures and requirements to the individuals who will work on this project

This CQA Plan as well as other site specific documents is required reading for all staff participating in the work effort. A current version of the site specific CQA Plan will be in possession of the field teams completing the remedial effort. All subcontractors will be required to comply with the procedures documented in this CQA Plan in order to ensure the quality and effectiveness of the final product.

1.2 Project Setting

The site is an area of groundwater contamination located along the eastern side of Clinton Road, approximately 0.2 miles south of the intersection with Old Country Road. Volatile organic compounds (VOCs) are present in the plume at concentrations that exceed health benchmarks.

The Record of Decision (ROD) for the site was signed on September 28, 2007. The selected remedy is groundwater extraction with ex-situ treatment, with discharge to Nassau County Recharge Basin No. 124. The selected remedy addresses contaminated groundwater in the mall area north (upgradient) of Garden City Municipal Supply Wells 10 and 11.

The RA is to be conducted in two phases, Phase I and Phase II, in accordance with final remedial design (CDM 2009). Phase I will include installation of extraction and monitoring wells, step and aquifer testing, and investigation derived waste (IDW) disposal of waste generated during well drilling. Phase II will include construction of the groundwater treatment facility (GWTF), trenching and piping, extraction well head completion, GWTF testing, and site restoration.

1.3 Quality Program Overview

As the EPA's RA Contractor, CDM is responsible for the overall construction QA on this project. CDM's approach to management of the quality of the RA implementation includes a combination of quality control by the subcontractor and quality assurance by CDM's Construction Supervisor. CDM provides definition and overall management of the quality approach to be followed by its subcontractors. The Construction Supervisor is responsible for the day-to-day coordination of quality assurance and quality control measures in the field.

The RA subcontractor is responsible for constructing the work in accordance with the plans and specifications (CDM 2009). The RA subcontractor is also responsible for controlling the quality of its work to meet contract plans, specifications, and related requirements. The subcontractor's QC is the systematic implementation of a program of inspections, tests, and production controls to attain the required standards of quality and to preclude problems resulting from noncompliance. Pursuant to Specification Section 01451, the RA subcontractor will establish an independent QC program and write a Contractor Quality Control (CQC) Plan. The CQC Plan must provide for tests and inspections pursuant to various technical specifications. It will define procedures to ensure that activities affecting quality are properly documented and accomplished in accordance with subcontract documents; written instructions; and industry standards, codes, and procedures. Furthermore, the CQC Plan will define methods for ensuring that activities affecting quality will be accomplished under controlled conditions.

1.4 CQA Plan Organization

This CQA Plan includes the sections described below.

- **Section 1: Introduction** – Describes the purpose and organization of CQA Plan, project setting, and the CQA Plan quality programs overview
- **Section 2: Construction Quality Assurance Organization** – Presents the organizations and key personnel involved in the construction of the RA, their roles, responsibilities and authorities

- **Section 3: Overview of Construction Quality Assurance/Quality Control Process** – Describes the three phases of construction quality control process and control of discrepant and nonconforming items
- **Section 4: Construction Quality Assurance/Quality Control Activities** – Describes the project specific QA/QC activities to be completed by CDM during RA
- **Section 5: Construction Management Activities** – Describes the procedures for overall management of construction schedule and cost to be implemented by CDM on this project
- **Section 6: Administration and Approval of Change in Work** – Describes the administrative procedures to approve and document any necessary changes in work that occur during the course of construction
- **Section 7: Project Completion and Record Completion** – Describes the process by which the work is inspected, tested, and approved
- **Section 8: References** – Document the references cited in the CQA Plan

Section 2

Construction Quality Assurance Organization

2.1 Purpose

The purpose of this section is to define the primary roles and responsibilities of key personnel from each party involved with implementing the construction QA program.

2.2 Roles and Responsibilities

The primary roles and responsibilities of key personnel from each party involved with the construction are summarized below. The Project Organization Chart, which illustrates the lines of authority and communication between parties, is included as Figure 2-1. The QC and QA functions of the project organizations are functionally integrated although contractually separate for Phase II activities. Figure 2-2 shows the functional structure of the project QC/QA team for Phase II activities.

2.2.1 EPA's Responsibilities

EPA is the lead agency of this project and has ultimate responsibility and authority for all aspects of its implementation. As such, EPA exercises approval authority for this CQA Plan. EPA personnel and their responsibilities are shown below:

Role	Contact	Responsibilities
Remedial Project Manager (RPM)	Caroline Kwan	Responsible for day-to-day technical and financial management of this project. Primary EPA contact for all aspects of work. Monitors the project for conformance with scope and budget contained in the EPA Statement of Work (SOW) and the approved Work Plan for this work assignment.
Contracting Officer	Debbie Butler	Responsible for overall contractual management of this project, including the associated RA subcontracts, under the RAC 2 contract. Monitors the project for conformance with the signed contract clauses, budget contained in the approved Work Plan for this work assignment and the terms and conditions. Has consent authority for all changes in scope and cost.
Project Officer	Helen Eng	Responsible for overall technical management of this project under the RAC 2 Contract. Monitors the project for conformance with the EPA SOW and approved Work Plan for this work assignment.

2.2.2 CDM's Responsibilities

CDM is EPA's RA Contractor under the Region 2 RAC 2 Contract for this work assignment. CDM is responsible for construction management on this project, including the provision of all procurement/subcontract management, project management, construction management and technical support required to successfully complete the work specified in the Subcontract documents and the EPA-approved Work Plan. CDM personnel and their responsibilities are shown below:

Role	Contact	Responsibilities	Qualifications
Site Manager	Thomas Mathew, PE	Responsible for day-to-day project management. Primary CDM contact for all aspects of work.	B.E. Civil Engineering, M.E. Environmental Engineering; over 25 years experience
Procurement/Subcontracts Manager	Vernon Wimberley	Responsible for procurement and overall management of the RA Subcontract.	B.S. Business Administration, B.A. Computer Information Systems; over 22 years experience
Project Engineer	Muzaffar Rahmani	Responsible for coordinating and/or performing all engineering tasks and tracking work status, schedule, cost on a daily basis under the direction/supervision of the Site Manager.	B.S. Math M.E. Environmental Engineering; 15 years experience
Construction Supervisor	Peter Connolly, PE	Responsible for performing resident engineering tasks for all Phase II work under the direction and supervision of the Project Engineer. Responsible for overseeing construction QC testing.	B.S. Chemical Engineering; over 20 years experience

Role	Contact	Responsibilities	Qualifications
Site Safety and Health Officer	Peter Connolly	Peter Connolly will act as the Site Safety and Health Officer (SSHO) during Phase II work and will be responsible for coordinating with the Treatment System Subcontractor SSHO and verifying that all work is performed in accordance with the Treatment System Subcontractor's Health and Safety Plan.	B.S. Chemical Engineering; over 20 years experience
QA Coordinator	Jeniffer Oxford, CHMM	Responsible for overseeing QA/QC on this project. Coordinates with the Project Engineer/Construction Supervisor regarding the status of construction QA/QC activities. Coordinates and/or performs QA field audits. Verifies that all EPA and CDM QA requirements are met.	B.S., Natural Sciences; 7 years experience in analytical chemistry; 19 years experience in environmental science
RAC 2 Quality Assurance Manager	Doug Updike, CHMM, ASQCMQ /OE	Responsible for ensuring that the RAC 2 quality program and its requirements are being implemented. Coordinates with the QA Coordinator to ensure project conformance with the RAC 2 quality assurance requirements.	B.S. Marine Biology, M.S. Marine Biology; over 17 years experience
Corporate Health and Safety Officer	Shawn Oliveira, CIH, C.S.P	Responsible for managing and monitoring CDM's health and safety program at the corporate level. Coordinates with the Health and Safety Coordinator to ensure project conformance with CDM health and safety requirements.	B.S. Chemistry; M.S. Environmental Engineering; over 11 years experience;

Role	Contact	Responsibilities	Qualifications
Health and Safety Coordinator	Jeniffer Oxford, CHMM	Responsible for overseeing health and safety on this project. Coordinates with the Project Engineer/Construction Supervisor regarding the status of construction health and safety activities. Verifies that all EPA and CDM health and safety requirements are met.	B.S., Natural Sciences; 7 years experience in analytical chemistry; 19 years experience in environmental science

CDM's Site Manager, QA Coordinator, Project Engineer, and Construction Supervisor are the primary personnel involved with construction QA. All assigned personnel must at a minimum possess general corporate technical knowledge of all aspects of the project, and must successfully execute the construction QA program on all aspects of the project. Individuals possessing experience in specialized areas will be added to the organization as required during construction. The QA Coordinator is responsible for overseeing the construction QA program and will coordinate with the Project Engineer regarding the status of construction QA/QC activities. The Project Engineer in conjunction with the QA Coordinator will have the following responsibilities during construction:

- Ensure that appropriate technical review is completed by qualified representatives for construction plans, specifications and drawings, and any modifications to the drawings or specifications.
- Review all design documentation, including the design drawings and specifications and modifications as they occur during construction.
- Provide assistance in determining that the construction has been completed in general conformance with the drawings and specifications.
- Maintain contact with the Site Manager, Construction Supervisor and RA Subcontractor regarding conformance with the QA/QC requirements.
- Provide assistance to the Construction Supervisor in the review and interpretation of field and laboratory testing results.
- Review of shop drawings and other submittals from the RA Subcontractor and all lower-tier subcontractors.
- Review all field and laboratory QC testing results for conformance with the specifications. Provide an interpretation of data to determine areas that are in conformance and in non-conformance with these documents. Determine areas which require reworking and/or repair.
- Perform periodic site visits to review construction progress and QA/QC procedures.

- Ensure that the Construction Supervisor is notified of any noted deficiencies in QA/QC testing results or procedures.

The Construction Supervisor is the primary onsite contact during Phase II construction that implements the construction QA program along with the RA Subcontractor personnel. In addition, the Construction Supervisor is responsible for the following tasks regarding QA:

- Record any onsite activities that could result in non-compliance with the design documents and report these activities to the Project Engineer
- Document field and laboratory testing as required by the specifications
- Observe construction materials, such as soils and piping, delivered to the Site to determine general conformance with material specifications
- Observe and record procedures used for Site preparation, construction of the treatment facilities and structures, and any deficiencies in these activities
- Prepare daily construction reports and logs
- Maintain a continuous record of any changes or modifications to the design drawings and specifications

2.2.3 CDM's Remedial Action Subcontractor

CDM's RA Subcontractor is responsible for completing construction of the groundwater treatment system in accordance with the Subcontract documents under CDM's direction and supervision.

The RA Subcontractor will be responsible for preparing a CQC Plan in accordance with the Subcontract requirements, and the plan will be approved by CDM. The Subcontractor's CQC Plan will be submitted to EPA for informational purposes upon receipt and approval by CDM. The CQC Plan will include, as a minimum, the following to cover all aspects of the design and construction operations, both on site and off site, including work by lower tier subcontractors, fabricators, suppliers, and purchasing agents:

- A description of the RA Subcontractor's quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three phase control system for all aspects of the work specified
- The name, qualifications, duties, responsibilities, and authorities of each person assigned a CQC function
- Procedures for scheduling, reviewing, certifying, and managing submittals, including those of lower tier subcontractors, offsite fabricators, suppliers, and purchasing agents
- Control, verification, and acceptance testing procedures for each specific test including the test name, feature of work to be tested, test frequency, and person responsible for each test

- Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance of tests including documentation
- Procedures for tracking construction deficiencies from identification through acceptable corrective action
- Reporting procedures, including proposed reporting formats
- A list of the definable features of work (DFW), as defined in Section 3.2
- A brief explanation of the duties of the CQC organization with respect to health and safety
- The RA Subcontractor's plan for training all CQC personnel

The RA Subcontractor will identify a CQC System Manager who will be responsible for overall management of QC and have the authority to act in all QC matters for the RA Subcontractor for all features of work. The CQC Manager must be an approved, qualified engineer or comparable individual to ensure compliance with the contract requirements. The CQC System Manager will have the following roles:

- Ensure that appropriate technical review is completed by qualified representatives for construction plans, specifications, and drawings, and any modifications to the drawings or specifications
- Review all design documentation, including the design drawings and specifications and modifications as they occur during construction
- Provide assistance in determining that the construction has been completed in general conformance with the drawings and specifications
- Maintain contact with CDM and any lower-tier subcontractors regarding conformance with the QC requirements
- Review of shop drawings and other submittals from all lower-tier subcontractors
- Document and review all field and laboratory QC testing results for conformance with the specifications and provide an interpretation of data to determine areas that are in conformance and in non-conformance with the Subcontract documents
- Ensure that the CDM Project Engineer or Construction Supervisor is notified of any noted deficiencies in QC testing results or procedures
- Maintain a continuous record of any changes or modifications to the Subcontract documents
- Record any onsite activities that could result in non-compliance with the Subcontract documents and report these activities to Construction Supervisor
- Observe construction materials delivered to the Site and determine general conformance with material specifications
- Observe and record procedures used for Site preparation, construction of the treatment facilities and structures, and any deficiencies in these activities
- Prepare daily QC reports and testing reports and logs as required by the contract

The RA Subcontractor may assign lower-tier subcontractors for implementation of specific tasks such as electrical or control system installation or plumbing. The CQC System Manager will be responsible to ensure that the QC requirements of the specifications are met for all tasks performed by lower-tier subcontractors.

2.2.4 New York State Department of Environmental Conservation

As per the Superfund Contract for this project, the New York State Department of Environmental Conservation (NYSDEC) is essentially EPA's "partner" in implementing this project. NYSDEC is in charge of monitoring and enforcing local environmental regulations.

NYSDEC will participate in various aspects of the project, including meetings, field oversight, and Pre-Final/Final Inspections and have opportunities to review the field Project Files, upon making advance requests to EPA. NYSDEC will be able to communicate directly with CDM and make recommendations, but will not have the authority to issue directions on EPA's behalf.

Section 3

Overview of the Construction Quality Assurance/Quality Control Process

3.1 Purpose

The purpose of this Section is to provide an overview of the construction QA/QC process, which generally includes three phases: 1) preparatory, 2) initial, and 3) follow-up, and control of discrepant and nonconforming items. These construction QA/QC phases are intended to ensure that all aspects of the work are completed in accordance with the subcontract requirement and applicable standards for materials, equipment, and workmanship. The scope and results of all activities completed during these phases of QA/QC inspections will be documented by the Construction Supervisor, as described in Section 4.0.

3.2 Definable Features of Work

A definable feature of work is an activity that is separate and distinct from other activities, has separate control requirements, and may be identified by different trades or disciplines. It may also correspond to work performed by the same trade, but in a different environment. The various divisions of the Subcontract specifications identify the definable features.

The DFW's for the site may include but are not limited to:

- Civil surveying
- Clearing and grubbing
- Yard piping trenching and installation
- Pilot testing for iron removal system
- Groundwater treatment building construction
- Groundwater treatment system equipment installation
- Rough-in of electrical boxes and wiring methods
- Lighting fixtures, receptacles, and accessories
- Panelboards, circuit breakers and motor control centers
- Water supply piping, fittings and supports
- Start-up and performance testing
- Process/groundwater sampling
- Concrete reinforcement and formwork
- Concrete mixing, placement, curing and finishing
- Chemical data acquisition
- Operation and maintenance
- Site restoration

3.3 Three Phases of Construction Quality Control

3.3.1 Preparatory Phase

The preparatory phase is conducted by the Construction Supervisor, along with the Subcontractor's site superintendent, for a given definable feature of work after all of the associated construction submittals have been approved. A meeting is scheduled in advance of the work activity to assure that there is sufficient time for any necessary corrections.

This phase includes the following activities:

- Review the applicable specification sections
- Review the applicable drawings
- Verify that all associated materials and equipment have been approved (as per the submittals) and field inspected for conformance with submittals
- Review any testing requirements to ensure that the necessary provisions have been made to complete such testing
- Verify that all required permits and licenses have been obtained and that all required notifications have been made
- Examine the work area to ensure that all required preparatory work has been completed
- Review the applicable sections of the health and safety plan, and jointly develop an activity hazard analysis to ensure that the applicable safety requirements will be met
- Discuss the standards of quality that apply to the work to be performed, along with the construction methods and approach to be used to complete construction, and identify any potential problems in meeting quality standards

3.3.2 Initial Phase

The initial phase is to be conducted by the Construction Supervisor, along with the Subcontractor's site superintendent when the Subcontractor is ready to start the work for any given definable feature of work. At any given time during the course of work, the Subcontractor's superintendent should be able to explain the scope of work in progress, as well as the applicable QA/QC requirements for its completion.

This phase includes the following activities:

- Inspect the work in progress for compliance with the Subcontract requirements and agreements made during the preparatory meeting
- Verify that the Subcontractor's quality controls are adequate to ensure compliance with the Subcontract requirements, including inspection and testing
- Resolve any problems or conflicts that may affect the quality of work
- Review the hazard analysis to ensure that it fully defines the work being performed
- Verify that all required personal protective equipment (PPE) is being used and monitoring is being performed
- Verify that the workmanship meets applicable requirements and standards

The initial phase will be repeated for each new crew assigned by the Subcontractor, and at any time when the Construction Supervisor determines that the required construction QA/QC requirements and standards are not being met.

3.3.3 Follow-Up Phase

This phase is conducted by the Construction Supervisor, along with the Subcontractor's site superintendent, at minimum, on a daily basis until each definable feature of work is complete.

This phase includes the following activities:

- Verify that the work has been completed in accordance with the Subcontract requirements and applicable standards
- Verify that all required field tests were properly completed and that acceptable results were obtained
- Identify and track discrepant and nonconforming items in accordance with Section 3.4

3.4 Control of Discrepant and Nonconforming Items

3.4.1 Discrepant Items

Discrepant items are those found during inspection or testing to be incomplete, but are correctable by further processing, as discussed in the following paragraphs.

Items that have been inspected and found in accordance with design documents are classified as acceptable. Engineering changes that make it necessary to alter these acceptable items by further field action are classified as new work subject to the same quality assurance, quality control and inspection requirements as was the original work.

Incomplete items that are discovered during field activities to be discrepant, but which are correctable by further prescribed processing are controlled and documented by the use of punch lists prepared and maintained by the Construction Supervisor. These punch lists describe the discrepancy which must be corrected before the item is completed, inspected and accepted. Discrepant items that are corrected within the same shift as discovered need not be punch listed, but are reported in the daily inspection log.

3.4.2 Nonconforming Items

Nonconforming items are those that have been completed, inspected and accepted, but are subsequently found to deviate from the Contract Documents. Nonconforming items are controlled and documented by the use of a Nonconformance Report. The verification of corrective actions taken in accordance with the Nonconformance Reports is the responsibility of the Construction Supervisor.

The Nonconformance Report is accurately and concisely written after consultation with the interested parties to ensure that the nonconforming item is correctly described, the appropriate criteria referenced, and sufficient data provided to facilitate a proper and complete disposition for resolving the nonconformity.

Each Nonconformance Report is given a disposition by CDM, which is the action required to correct or resolve the nonconformance.

Nonconformance Reports are dispositioned in one of the following four ways:

- "Rework" is the action by which nonconforming item is processed to make it conform to specified requirements
- "Repair" is the action to make an item perform its intended use but not necessarily meets all specified requirements
- "Reject" is the action taken to eliminate a nonconforming item from its specified use and replace it with a conforming item
- "Use-As-Is", is the action taken to accept an otherwise unacceptable item

The Construction Supervisor is authorized to make "Rework" and "Reject" dispositions. "Repair" and "Use-As-Is" dispositions are obtained from the Site Manager by means of a Nonconformance Report. Approval from the EPA is required for all "Repair" and "Use-As-Is" dispositions.

Upon completion of "rework" and "reject" dispositions, the Construction Supervisor makes a re-inspection to determine acceptability. If the item is found acceptable as the result of the re-inspection, the Construction Supervisor documents their acceptance by signing and dating the Nonconformance Report. If the item is found unacceptable during the reinspection, the Construction Supervisor dates and reprocesses the Nonconformance Report. If the final disposition is "reject", the Construction Supervisor Representative must take adequate measures to ensure that a rejected item is not inadvertently used, after which the Construction Supervisor signs and dates the Nonconformance Report. Information copies of each completed Nonconformance Report are sent to the Site Manager. Distribution of the Nonconformance Report is shown on the Nonconformance Report.

All inspection documentation including punch list of discrepant item, punch list of nonconforming item, inspection log, report of field correction, repair/use as-is memorandum, and nonconformance memorandum will be recorded on standard forms included in Appendix A. The punch list form will be used to track deficiencies and corrective actions. The completed form will be reviewed by the CDM Site Manager, and distributed accordingly to distribution requirements, thus becoming permanent part of the site records.

Section 4

Construction Quality Assurance/Quality Control Activities

4.1 Purpose

The purpose of this section is to present the project-specific construction QA/QC activities to be completed by CDM on a routine basis during implementation of the RA at the Site.

The Subcontract documents play an important role in the implementation and monitoring of QA/QC activities. The contents of these documents establish QA/QC elements of activities occurring before, during, and after the construction. Specific to QA/QC, the specifications may, depending on the given component of construction, specify any or all of the following:

- Manufacturer and model number for specific equipment
- Performance standards or operating conditions to assist the Subcontractor in the selection and purchase of equipment
- Required construction materials
- Applicable codes, standards, and specifications to govern material and workmanship quality
- Information to be submitted for technical review
- Coordination of work activities for all elements of construction
- Manufacturer or field testing requirements
- Performance guarantees
- Workmanship/equipment warranties

Fulfillment of the specifications provides the framework for QA/QC measures by identifying the appropriate equipment and materials to be utilized, indicating acceptable construction practices, requiring on and off-site testing, and specifying performance and workmanship warranties. To gauge compliance with the requirements of the Subcontract documents, QA/QC activities are performed such as the review of technical submittals and material/equipment testing and inspection. The following activities are further discussed below.

4.2 Review of Technical Submittals

4.2.1 Task Description

For certain elements of construction, the Subcontract specifications require that the RA Subcontractor prepare and submit various technical data to CDM for review. The purpose of the submittals is to: 1) obtain detailed information regarding how the Subcontractor intends to complete the work and 2) verify that the intended work conforms to Subcontract requirements and intent.

Technical data submittals, which are commonly referred to as “shop drawing” submittals, are required for many elements of construction. Required submittals

generally include, without limitation, detailed project plans, material samples, manufacturer's product specifications and literature, testing data, engineering calculations, detailed engineering drawings (e.g., site/civil, mechanical, electrical, process and instrumentation), operations and maintenance instructions, certifications, warranties, and as-built documentation. Some submittals are subject to review and approval by CDM for conformance to the Subcontract requirements and intent; others are provided for informational purposes only. A copy of the Submittal Register from Specification Section 01330 of the Subcontract documents is included in Appendix B.

Shop drawing review is an essential part of the construction QA process, which begins upon CDM's issuance of the Notice to Proceed (NTP) and continues through final completion of construction. The Subcontractor's shop drawings must contain all quantities, dimensions, field construction criteria, materials, model numbers, and other information pertinent to definable features of work, as required by the Subcontract specifications. Submittals subject to review by CDM must be approved in writing, before the Subcontractor initiates any work or construction for an associated definable feature of work.

The RA Subcontractor will be required to submit a submittal schedule for major submittal packages in advance so CDM's reviewers will be available to complete the submittal reviews in a timely and comprehensive manner.

4.2.2 Process, Review and Acceptance

The following general procedures will be used to manage the Subcontractor submittals:

- Subcontractor will number and certify the completeness of all submittals before submitting to CDM.
- Subcontractor will submit four paper copies in accordance with Specification Section 01330, each with separate transmittal form, of all required submittals to the Project Engineer.
- Upon receiving the submittal, the Project Engineer will log the submittal and provide a review to ascertain whether the package is complete. If the submittal is incomplete, the submittal will be returned to the Subcontractor.
- The original submittal transmittal and all copied attachments will be logged into the document tracking system. The Project Engineer will then review submittals and/or coordinate such reviews to the appropriate reviewers (discipline reviews within the design team).
- The Project Engineer will consolidate submittal review comments into a single coordinated action, and makes the appropriate notations and action taken on the submitted documents.
- The Project Engineer will return one copy of the submittal to the Subcontractor with original stamp of the action required and review comments, and will record the action code in the submittal log.

- The Project Engineer will update the Site Manager and Construction Supervisor regarding the status of submittal reviews, and provides notification when the submittal requirements have been met for a definable feature of work.
- The Project Engineer will maintain copies of all submittals in the office project files, and send copies of all approved submittals to the Construction Supervisor for inclusion in the field project files.
- The Project Engineer will transmit copies of approved submittals to the EPA RPM for documentation purposes.

The seven actions that may be taken for each submittal are:

- Code 1 – “APPROVED” – This code is assigned when there are no notations or comments on the submittal. When returned under this code, the Subcontractor may release the equipment and/or material for manufacture.
- Code 2 – “APPROVED AS NOTED” – This code is assigned when a confirmation of the notations and comments IS NOT required by the Subcontractor. The Subcontractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.
- Code 3 – “APPROVED AS NOTED/RESUBMIT” – This combination of codes is assigned when notations and comments are extensive enough to require a re-submittal of the package. The Subcontractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. The re-submittal is to address all comments, omissions, and nonconforming items that were noted.
- Code 4 – “NOT APPROVED” – This code is assigned when the submittal does not meet the intent of the contract documents. The Subcontractor must resubmit the entire package, revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the requirements of the contract documents.
- Code 5 – “RECEIPT ACKNOWLEDGED (Not subject to Review or Approval)” – This code is assigned to acknowledge receipt of a submittal that is not subject to the review and approval, and is being filed for informational purposes only. This code is generally used in acknowledging receipt of means and methods of construction work plans, field conformance test reports, and health and safety plans.

4.3 Field Inspection and Testing of Materials, Equipment, and Workmanship

4.3.1 Field Inspection and Testing

4.3.1.1 Task Description

The Subcontract specifications include inspection and testing requirements for materials, equipment, and workmanship, which must be met upon delivery or installation at the Site by the Subcontractor. The intent of these requirements is to verify that: 1) all construction work is executed in accordance with the Subcontract documents and approved shop drawings and 2) all materials, equipment, and

workmanship are free of defects. Inspections will be performed by the Construction Supervisor on a routine basis, from material/equipment until final installation, to verify that such items meet the specifications and are properly installed. The three phases of construction QA/QC described in Section 3.3 will be implemented as part of this task. The construction inspection shall be performed in accordance with CDM's *Construction Observation Guidelines for Project Representatives* (QMP-2A; CDM 2006).

4.3.1.2 Procedures for Task Completion

As per the Subcontract specifications, the following types of inspections and tests will be performed, without limitation, to verify that construction is completed in accordance with the Subcontract specifications:

- Inspection of all materials and equipment upon delivery and prior to installation for defects and for conformance with the specifications and approval of shop drawings
- Inspection of field activities/installation for compliance with Subcontract drawings and the RA Subcontractor's approved work plans
- Hydraulic testing and inspection of yard pipe for leakage following placement, but prior to backfill
- Geotechnical testing for foundation design
- Compaction testing of backfilled areas
- Field running tests of submersible pumps
- Slump testing of concrete
- Compressive strength testing of concrete
- Air content testing of concrete
- Sieve analysis for all imported granular materials/aggregate
- Chemical testing for all imported granular materials in accordance with the site UFP-QAPP
- Chemical testing of excavated soil and stripped topsoil in accordance with the site UFP-QAPP prior to backfilling/placement
- Mill test certificates for steel reinforcement
- Inspection and approval of the incoming electrical, water, and telephone service by the respective utility companies and local inspection agencies with certificate of inspections to be provided
- Field tests of all miscellaneous electrical controls
- Testing of all yard wire and cable following installation, but prior to final connection
- Testing and adjustment/calibration of all process instrumentation
- Testing of the process control system following connection to yard features associated with the pumping system
- Testing of the electrical grounding system for treatment system
- Testing of the incoming electrical service by local utility providers
- Chemical and bacteriological testing of the potable water line in accordance with the utility and state requirements
- Inspection of waste management practices

A comprehensive Pre-Final Inspection, Initial Testing Program, and Final Inspection will also be completed as part of GWTF completion. These tasks are covered under Section 7.1.1.

4.3.1.3 Quality Control Testing and Sampling

This section summarizes the primary testing and sampling that will be performed by the RA Subcontractor and or CDM as part of site construction. CDM will oversee the RA Subcontractor testing procedure and results to verify conformance with the subcontract specifications.

Earthwork

Chemical and geotechnical testing of granular materials, topsoil, backfill material, and excavated soil will be performed in accordance with Specification Sections 01450 and 02300, and the site UFP-QAAP.

Moisture-density and field in-place density tests shall be performed in accordance with Specification Section 02300.

Concrete Compressive Strength, Slump, and Air Content Testing

Concrete compressive strength, slump, and air content testing will be performed in accordance with Specification Section 03300. Laboratories testing concrete materials shall be in compliance with ASTM E 329.

Hydrostatic/Leakage Testing

Hydrostatic/leakage testing for the GWTF yard and process piping will be performed in accordance with Specification Section 15200. Hydrostatic/leakage testing for the potable water line will be performed in accordance with Specification Section 02510 and Nassau County Environmental Health requirements.

Pavement

Materials and compaction testing will be performed in accordance with Specification Section 02576 and the New York State Department of Transportation (NYSDOT) Standard Specifications.

Electrical

The RA Subcontractor will perform acceptance testing for all motors and equipment provided under Divisions 11, 13, 15, and 16 in accordance with the individual specification sections. All electric equipment will be tested for conformance with industry standards, manufacturer's tolerances, and the design specifications prior to energizing equipment.

The electrical testing will include, at a minimum:

- Fall-of-potential tests or alternative per Institute of Electric and Electronic Engineers (IEEE) Standard No. 81-1991 on the main grounding system

- Point-to-point tests to determine the resistance between the main grounding system and all major electrical equipment frames, system neutral, and or derived neutral points
- Verification of grounding of instrumentation equipment and line surge protection equipment
- Over potential, high potential, insulation resistance and shield continuity tests for all medium voltage cables and megger tests of all low voltage power system cable
- Verification that all terminations at transformers, equipment, panels and enclosures are connected to the proper terminals by producing a 1, 2, 3 rotation on a phase sequenced motor when connected to "A," "B" and "C" phases
- Testing of all lightning and surge arrestors service entrance equipment, power distribution equipment, motors, control centers, utilization equipment, etc. and verification that all lightning and surge arrestors are properly grounded and are being applied within their ratings for the type of system on which they are connected (i.e. ungrounded, solidly grounded or impedance grounded systems)

After the electrical distribution equipment has been energized the RA Subcontractor will perform at a minimum, the following tests:

- Phase rotation will be verified at the service entrance and distribution switchgear, motor control centers and panelboards. The phase rotation will be A, B, C from front to back, top to bottom and from left to right.
- The taps on the transformers will be adjusted to produce a nominal voltage at the terminals of the transformers.
- All motors will be jogged to verify rotation.
- The full load current draw of each motor will be checked and recorded. Where power factor correction capacitors are provided, the capacitor will be in the circuit at the time of the measurement.
- Interlocking, control and instrument wiring will be checked for each system and/or part of a system to prove that the system will function properly as indicated by control schematic and wiring diagrams.

4.3.2 Acceptance of Work

The routine acceptance of construction for definable features of work will be documented in writing. As indicated above in this section and further described in Section 4.5, all work completed by CDM and the RA Subcontractor will be documented in the Construction Supervisor log book and summarized in Daily QC Reports on a routine basis. This includes the scope and results of construction QA/QC inspection and testing activities.

4.4 Meetings

4.4.1 Pre-construction Conference

Following issuance of the NTP, CDM will schedule, conduct, and administer a pre-construction conference at CDM's office. The purpose of the pre-construction conference is to discuss the project in detail, identify and resolve any issues requiring clarification, and achieve understanding among all parties regarding the requirements for completion of work.

Participants at the pre-construction conference will include the following:

- CDM - Site Manager, Project Engineer, Construction Supervisor, Procurement/Subcontracts Manager
- RA Subcontractor - project manager, project engineer, and other key project staff (including lower-tier subcontractors)
- EPA - RPM and/or authorized representative(s)
- NYSDEC - project manager and/or authorized representative(s)

The following issues will be discussed during this conference:

- Roles and responsibilities
- Lines of communication
- Technical scope of work
- Schedule and lead items
- Terms and conditions
- Standard work hours and notifications
- Measurement and payment
- Project plans
- Request for information procedures
- Shop drawing and other submittal procedures
- Change order procedures
- Coordination with local authorities
- Permits
- Emergency procedures
- Health and safety
- Construction QA/QC
- Environmental considerations
- Community relations and considerations
- Record keeping and reporting
- Material storage
- Staging areas
- Field offices
- Site security

4.4.2 Pre-work Conference

Approximately two weeks prior to start of GWTF construction, a Pre-Work Conference will be held between CDM and the RA Subcontractor. The purpose of conference is to review subcontractor submittals, payrolls and labor relations, project

schedules and payment, and procurement of materials. Questions concerning the administrative requirements outlined during the Pre-Construction Conference or any other aspect of the project may also be addressed.

Prior to the Pre-Work Conference, the following project submittals will be made by the RA Subcontractor in accordance with the Subcontract specifications:

- Initial Project Schedule (Specification Section 01320)
- Site Safety and Health Plan (Specification Section 01351)
- Environmental Protection Plan (Specification Section 01355)
- Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) (Specification Section 01450)
- Contractor Quality Control Plan (Specification Section 01451)
- Temporary Site Facility Layout Plan (Specification Section 01500)
- Transportation Plan (Specification Section 02120)
- Excavation, Trenching and Backfill Plan (Specification Section 02300)
- Soil Erosion and Sediment Control Plan (Specification Section 02370)
- Groundwater Treatment Plan (Specification Section 13300)

A preliminary review of these project plans will be completed by CDM in advance of the Pre-Work Conference. The plans will be discussed during the conference to facilitate any revisions necessary for approval prior to mobilization.

Participants at the Pre-Work conference will include the following:

- CDM - Site Manager, Project Engineer, and Construction Supervisor
- RA Subcontractor - project manager, project engineer, site superintendent, and other key project staff (including lower-tier subcontractors)
- EPA - RPM and/or authorized representative(s)

4.4.3 Pre-Construction Quality Control Conference

After the Pre-Work Conference, before start of construction, a Pre-Construction Quality Control Conference will be held between CDM and the RA Subcontractor. The purpose of this conference is to discuss the QC procedures to be used for all onsite and offsite work, and defining the interrelationship of the RA Subcontractor's management and the CDM QA.

4.4.4 Pre-Construction Safety Conference

After the Pre-Work Conference, before start of construction, a Pre-Construction Safety Conference will be held between CDM and the RA Subcontractor. The purpose of this conference is to discuss how work will be implemented including, but not limited to, work procedures, safety considerations associated with those work procedures, heavy equipment to be used, and safety requirements, such as training equipment.

4.4.5 Progress Meetings

As per the work plan, CDM will conduct weekly progress meetings during active periods of work through the duration of construction. The purpose of these meetings is to discuss project status, schedule, and issues requiring clarification or resolution.

The schedule, agenda, and minutes for each meeting will be coordinated by the Construction Supervisor. On-site personnel from all parties will assemble in the site trailer for these meetings; all other participants will tie in via telephone from their respective locations.

The meeting participants will generally include the following:

- CDM - Site Manager, Project Engineer, Construction Supervisor, Procurement/Subcontracts Manager (as needed), other key personnel including lower-tier subcontractors (as needed)
- RA Subcontractor - project manager, project engineer, site superintendent (during construction), other key personnel (as needed)
- EPA - RPM and/or authorized representative(s)
- NYSDEC - project manager and/or authorized representative(s)

4.4.6 Work Deficiency and Resolution Meetings

Work deficiencies and resolutions will generally be discussed during weekly progress meetings. If necessary, CDM will arrange for separate meetings that are dedicated to addressing work deficiency issues. The purpose of such discussions or meetings is to: 1) clearly define any work deficiencies and their corresponding resolutions and 2) monitor the status of corrective action work until complete. CDM and Subcontractor construction QA/QC representatives will participate during these meetings.

4.5 Documentation

4.5.1 Field Log Book

The Construction Supervisor will record the scope and results of all field inspections and tests in a standard form included in Appendix A and supplement with entries in the field logbook. The field logbook will be completed per CDM Technical Standard Operating Procedure (SOP) 4-1, Field Logbook Content and Control, which is included in Appendix C.

With regard to this project, the following general types of information will be recorded on a routine basis:

- Date and weather conditions
- Personnel and equipment on site
- Status of construction activities
- Details regarding deliveries of supplies and equipment
- Details regarding wastes generation, handling, characterization, and storage
- Details regarding off-site shipments of wastes, including transporter and disposal facility information

- Scope and results of onsite meetings (e.g., planning, health and safety, construction QA/QC)
- Scope and results of construction QA/QC activities
- Scope and results of health and safety activities
- Scope and results of site visits and inspections by local authorities
- Scope and results of interactions with property owners and the public
- Details regarding any accidents or health and safety incidents
- Details regarding field changes and change orders
- Details of measurements for pay items
- Documentation and measureable quantities (if applicable) of green remediation practices implemented

4.5.2 Daily Status Reports

The Construction Supervisor will keep a daily log documenting all work conducted and completed by the RA subcontractor each day. The daily status report form included in Appendix A will be completed to document the daily activities for the project. The log may include, but not be limited to the following items:

- Project name, location, and date
- Weather conditions including temperature, and wind direction and speed
- Construction activities completed and/or in progress
- Description and location of areas being tested or observed
- Off-site materials received and quality verification documentation
- Calibration of test equipment
- Inspections performed
- Equipment, personnel, and material deployed each day and brought to the site
- Any problems or concerns with regard to site operations
- Items requiring action and resolution
- All construction QC data and information collected
- Visitor records
- In-field modifications
- Green remediation practices implemented with measureable quantities (if applicable)

In addition, the RA Subcontractor (treatment system) will submit their daily QC reports to the CDM's Construction Supervisor for review. The Construction Supervisor will review the reports for consistency with CDM's daily status report prior to submitting CDM's daily status report to CDM's Site Manager. CDM's daily status report will be submitted to the Site Manager within 24 hours of each construction day.

4.5.3 Bi-weekly Progress Reports

Bi-weekly progress reports will be prepared by CDM during construction to summarize the overall project and its progress to date. They will contain, at a minimum:

- Personnel on-site
- Summary of work performed for the reporting period
- Problems and deficiencies noted, and corrective actions taken
- QC testing performed and testing results
- A brief description of work activities anticipated for the next reporting period
- Change orders
- Project photographs

4.5.4 Standard Forms

In addition to the log book, the Construction Supervisor will document details for certain types of activities using standard forms. The following standard forms are included in Appendix A:

- Contract Submittal Review
- Daily Status Report
- Inspection Log
- Punch List of Discrepant Items
- Punch List of Non-conforming Items
- Report of Field Correction
- Repair/Use As-Is Memorandum
- Non-Conformance Memorandum
- Request for Information
- Field Order
- Work Change Directive
- Change Order
- Photo Log
- Submittal Tracking Log

4.5.5 Submittal Register

The Project Engineer will use the Subcontract submittal register contained in Specifications, Section 01330 to track the status of the Subcontractor's submittals, from initial submission through final approval by CDM. Submittal tracking log included in Appendix A or the Primavera Contract Manager Program will be used to track all submittals. The tracking log or the Primavera Contract Manager Program will be updated by the Project Engineer on a regular basis and shared with the Site Manager, Construction Supervisor, and Subcontractor to maintain a shared understanding regarding the status of submittals.

4.5.6 "Working Copy" of Specifications and Drawings

A "working copy" of the Subcontract specifications, Subcontract drawings, and Subcontractor's approved detailed design drawings will be reserved by CDM for use in recording as-built information during the course of construction. Variations between the design and as-built conditions will be noted on the working copy using red ink, along with the corresponding date of entry and author's initials. Prior to on-site construction, the working copy will be maintained by the project engineer. Upon initiation of on-site construction, the working copy will be brought to site and maintained by the Construction Supervisor.

Following the completion of construction, CDM will use the working copy to verify that the as-built conditions of construction have been accurately recorded on the Subcontractor's record drawings.

4.5.7 Field Project Files

A copy of the project files will be maintained at the site during on-site construction. The Construction Supervisor will be responsible for establishing and maintaining these files. The project files will include, but not be limited to, the following:

- Project personnel information
- Permits
- Meeting minutes
- Correspondence
- Submittals and submittal reviews
- Requests For Information (RFI)
- Telephone call reports
- Construction progress schedules
- Daily QC reports
- Weekly progress reports
- Photographs and photo logs
- Field orders
- Work change directives
- Change orders
- Test and inspection records
- Accident reports
- Certificate of Substantial Completion
- Certificate of Construction Completion
- Record drawings
- Certifications
- Log books

The project files will be maintained by CDM in the field using portable, water resistant, lockable filing containers. The files containers will be kept in the field trailer and locked when CDM is not present. The file structure will generally coincide with the divisions and sections of the Subcontract specifications; approved Subcontractor submittals and related project correspondence will be organized accordingly. The file structure will also include separate sections for resident engineering and field administration records, such as log book notes, photographs, forms, schedules, meeting minutes, change orders, and other documents required from CDM under this work assignment.

QA audits of the field and office project files will be performed by CDM QA staff to verify the files are maintained in accordance with the EPA RAC 2 Contract requirements. The audits will be performed by someone thoroughly familiar with construction projects. The scope and results of these audits and any corrective actions will be documented and distributed to CDM's management.

4.5.8 Project Photographs

All field activities will be photographed via digital camera by both CDM and the Treatment System Subcontractor. CDM will perform photographic documentation in accordance with CDM's Technical SOP 4-2, Photographic Documentation of Field Activities, which is included in Appendix C. Photographic documentation activities will be documented in the field logbook and on a photograph tracking log. The photograph tracking log will be updated on a weekly basis.

The Treatment System Subcontractor is required to perform photographic documentation activities in accordance with Specification Section 01380.

For photographs taken by both CDM and the Treatment System Subcontractor, the photographs will be downloaded from the camera(s) on a daily basis. The photographs will either be downloaded to a server that is routinely backed up or the photographs will be burned on a CD.

Section 5

Construction Management Activities

5.1 Purpose

The purpose of this section is to describe the construction management procedures to be implemented by CDM on this project. In particular, this section focuses on the procedures that will be used for overall management of construction schedule and cost.

5.2 Procedures

5.2.1 Review Construction Supervisor's Field Observations and Documentation

The most important means of measuring construction progress are Construction Supervisor inspection, testing, and documentation, as described in Section 3.3, Section 4.3 and Section 7. The Construction Supervisor observations, field logs, photographs, standard forms included in Appendix A, and internal reports will be used by the Site Manager and Project Engineer to: 1) verify the accuracy of submittals and invoices received from the RA Subcontractor and 2) ensure that the work is properly staffed, equipped, and managed on site by the Subcontractor to meet critical schedule milestones. As a result of these reviews, the CDM Site Manager shall promptly raise any significant scope, schedule, or cost issues with the Subcontractor for discussion and resolution.

5.2.2 Review Subcontractor Schedules

The RA Subcontractor is required to submit a construction schedule and to routinely update it during the course of work. These schedule submittals will be reviewed by the Project Engineer and Site Manager to gauge progress and identify any trends that may impact cost or schedule. Particular attention will be placed on ensuring that critical lead items (e.g., local permit and inspection requirements, utility service installation) and risk considerations (e.g., natural disasters) are properly identified, planned for, and attended to. As a result of these reviews, the CDM Site Manager shall promptly raise any significant scope, schedule, or cost issues with the RA Subcontractor for discussion and resolution.

5.2.3 Review Subcontractor Invoices

The RA Subcontractor must submit invoices to obtain progress payments for completed work. The invoices will be reviewed by the Site Manager and Project Engineer to track payment progress and incurred-to-date cost. Definable items of work must be completed and accepted according to the Subcontract specifications, before payment can be made. The Site Manager and Project Engineer will review each invoice for consistency with actual work completed, per the Construction Supervisor's daily status reports and field records. Additional input or clarification will also be obtained from the Construction Supervisor, when necessary to complete such reviews. Any discrepancies identified by CDM from invoice reviews will be promptly raised with the Subcontractor by the Site Manager for discussion and resolution.

If the Site Manager or Project Engineer determines that the invoice is inconsistent, incorrect, or otherwise unsatisfactory in any manner, the subject invoice will be returned to the Subcontractor for correction.

5.2.4 Attend Meetings

As indicated in Section 4.4, the Subcontractor is required to participate in various planning and progress meetings during the course of work to discuss and resolve issues pertaining to work scope, schedule, and payment. As also indicated, the Site Manager and Project Engineer will participate in these meetings. The meetings will be used as a tool to effectively track all work in planning and progress and to identify, discuss, and resolve scope, schedule, and payment issues before they become problems.

Section 6

Administration and Approval of Changes in Work

6.1 Purpose

The purpose of this section is to describe the administrative procedures that will be used by CDM to approve and document any necessary changes in work that occur during the course of construction.

6.2 Definitions

The following definitions apply to this section:

- Field Order - A field order is a written order issued by CDM, which orders minor changes in work to be performed in accordance with the general conditions of the Subcontract and does not involve a change in Subcontract price or schedule. It is also typically used to document clarifications and interpretations in the Subcontract documents. A copy of CDM's standard field order form is included in Appendix A and will be used for this purpose. Field orders must be approved in advance by the Project Engineer or Site Manager.
- Work Change Directive - A work change directive is a written directive from CDM to the Subcontractor, ordering: 1) the addition, deletion, or revision of work or 2) responding to emergencies or unexpected physical conditions under which the work is to be performed. A work change directive will not change the Subcontract price or schedule. However, it serves to document CDM's and the Subcontractor's intent to subsequently incorporate work changes associated with such directives into change orders (defined below), following negotiations as to the effect, if any on Subcontract price and schedule. A copy of CDM's standard work change directive form is included in Appendix A and will be used for this purpose. Work change directives must be approved in advance by the Site Manager.
- Change Order - A change order is a written order issued by CDM to the RA Subcontractor. Change orders are issued as a result of changed or unexpected conditions encountered during the course of work, which require changes to one or more of the following: 1) scope of work and 2) materials, methods, or equipment. They are used to document changes to the Subcontract documents by increasing or decreasing scope of work, altering the character of work, adjusting the schedule requirements, and/or establishing the price for such changes. A copy of CDM's standard change order form is included in Appendix A and will be used for this purpose. Change orders must be approved in advance by the Site Manager and Procurement/Subcontracts Manager.

6.3 Procedures

6.3.1 Field Orders

Field orders will be issued by CDM to approve and document all minor changes in work that do not involve significant changes in scope, or any changes to the Subcontract price or schedule. Minor changes in work are generally considered to be changes that do not impact: 1) treatment processes design or philosophy, 2) terms and conditions of property access agreements, and 3) terms and conditions of local permit equivalency approvals.

The following procedures will be used for issuing field orders:

- Upon identifying the need for a field order, the Construction Supervisor will verbally notify the Project Engineer and Site Manager regarding the scope of the associated change in work.
- The Site Manager will, in turn, provide the EPA RPM with courtesy notification regarding the scope of the field order and request verbal consent.
- The Construction Supervisor will document the associated changes in scope on the field order form (included in Appendix A) and the form will be sent to Project Engineer or Site Manager for review and approval.
- The Project Engineer or Site Manager will review the field order, make any necessary revisions, approve it (i.e., signing and dating it), and return it to the Construction Supervisor.
- The Construction Supervisor will request the Subcontractor's site superintendent or authorized representative to approve the field order by signing and dating it. The Subcontractor will not be allowed to initiate any work associated with the field order until it has been approved by both parties.
- Copies of the executed field orders will be distributed by the Construction Supervisor to the Project Manager, Project Engineer and Subcontractor. The Project Manager will forward copy of the executed field orders to the EPA RPM.

6.3.2 Work Change Directives

Work change directives will be issued by CDM to document and approve changes in work, which: 1) involve significant changes in Subcontract scope AND 2) require prompt action to avoid or minimize significant impacts to schedule or cost. Significant changes in work are all changes that cannot be considered minor, as defined in Section 6.3.1. Work change directives do not change the Subcontract price or schedule. Rather, they serve to document CDM's and the Subcontractor's intent to subsequently incorporate the associated changes as part of corresponding change orders, following negotiations regarding the effect of such changes, if any, on Subcontract price or schedule. All work change directives will lead to the issuance of corresponding change orders, as covered under Section 6.3.3.

The following procedures will be used for issuing work change directives:

- Upon identifying the need for a work change directive, the Construction Supervisor will verbally notify the Project Engineer and Site Manager regarding the scope of the associated change in work, along with benefit (i.e., in terms of impact to schedule and/or cost) for implementing prompt action versus waiting for a change order to be processed and approved.
- The Site Manager will, in turn, provide the EPA RPM with courtesy notification regarding the scope of the work change directive, along with the associated impacts to scope and/or schedule that could result.
- The Project Engineer or Construction Supervisor will document the associated changes in scope on the work change directive form (included in Appendix A), and the form will be sent to the Site Manager for review and approval.
- The Site Manager, in consultation with the Project Engineer and Procurement/Subcontracts Manager, will review the work change directive, make any necessary revisions, approve it (i.e., by signing and dating it), and send a courtesy copy to the EPA RPM.
- The Site Manager will return the work change directive form to the Construction Supervisor.
- The Construction Supervisor will request the Subcontractor's site superintendent or authorized representative to approve the work change directive by signing and dating it. The Subcontractor will not be allowed to initiate any work associated with the work change directive until it has been approved by both parties.
- Copies of the executed work change directives will be distributed by the Construction Supervisor to Site Manager, Project Engineer, and Subcontractor. The Site Manager will forward copy of the executed work change directives to EPA RPM.
- Change orders will be initiated by the Project Engineer concurrently with work change directives, as described in Section 6.3.3.

6.3.3 Change Orders

Change orders will be issued by CDM to document and approve changes in work, which involve significant changes in Subcontract scope or any changes to Subcontract schedule or price. Significant changes in work are all changes that are not considered to be minor, as defined in Section 6.3.1.

The following procedures will be used for issuing change orders:

- Upon identifying the need for a change order, the Construction Supervisor will verbally notify the Project Engineer and Site Manager regarding the scope of the associated change in work, along with the potential impacts to schedule and/or cost.

- The Site Manager will, in turn, provide the EPA RPM with courtesy notification regarding the scope of the change order, along with the associated impacts to scope and/or schedule that could result. If there is a potential that the change order may require consent by the EPA Contracting Officer (see Section 6.3.4, below), then such notification will also be provided to the EPA Contracting Officer.
- The Project Engineer or Construction Supervisor will document the associated changes in scope on the change order form (included in Appendix A), then send the form to the Site Manager for review and approval.
- The Site Manager, in consultation with the Project Engineer and Procurement/Subcontracts Manager, will review the change order, make any necessary revisions to it, and approve it (i.e., by signing and dating it). If necessary, the Site Manager will arrange for a meeting with the Subcontractor to negotiate any conditions of the change order that are not readily acceptable to both parties, prior to completing this step.
- The Site Manager will send the change order to the Procurement/ Subcontracts Manager for approval. A copy of the change order will also be sent to the EPA RPM for review.
- The Procurement/ Subcontracts Manager will approve the change order, by signing and dating it, and send the change order to the Subcontractor for review and written approval. The Subcontractor will not be allowed to initiate any work associated with the change order until it has been approved by both parties.
- The Subcontractor will return a signed copy of the change order to the Procurement/Subcontracts Manager.
- Copies of executed change orders will be distributed by the Procurement/ Subcontracts Manager to the Site Manager, Project Engineer, Construction Supervisor, Subcontractor, and EPA RPM.

6.3.4 “Request for EPA Consent” Packages

If the cumulative value of change orders reaches \$250,000, CDM is contractually required to obtain written consent from the EPA Contracting Officer, before approving any additional change orders that increase the Subcontract price. If this threshold is reached, CDM will prepare a formal “Request for EPA Consent” package, which will be submitted to the EPA Contracting Officer for review and approval. This package will be prepared by the Procurement/Subcontracts Manager in consultation with the Site Manager and Project Engineer, and it will contain the pertinent details (i.e., changes to scope and price) of the contributing change orders.

This contractual requirement is also re-triggered in increments of \$250,000. Therefore, each time a consecutive group of change orders reaches \$250,000 in value, a written consent will be obtained by CDM from the EPA Contracting Officer in advance, as described above.

The Procurement/Subcontract Manager is responsible for monitoring the project to ensure conformance with this requirement. Conformance will be evaluated prior to approving each change order

Section 7

Project Completion and Record Documentation

7.1 Verification of Project Completion

This section describes the processes by which the work is inspected, tested, and approved.

The construction completion process for the GWTF includes four primary phases conducted in the following order:

1. Punch-Out Inspection and Testing
2. Pre-Final Inspection
3. Initial Testing Program (ITP)
4. Final Inspection

Substantial Completion for the GWTF is determined based on acceptance of the Pre-Final Inspection, and Construction Completion is achieved after all four of these processes are completed, at which time the facility will be operating under the 1-year Operational and Functional (O&F) period. After the 1-year O&F period, a Post-Final Inspection of the GWTF will be conducted to verify that all the equipment is in good condition and that all work items and deficiencies have been addressed and corrected prior to transfer to EPA.

The RA Subcontractor will provide advance, written notification to CDM regarding the tentative date for each inspection or testing event, and initiate scheduling of the inspection/testing date. CDM will, in turn, consult with all applicable parties (EPA, NYSDEC, etc.), and finalize the respective inspection/testing date.

The Project Engineer, in consultation with the Construction Supervisor, will prepare an internal checklist in advance of each inspection/testing event, which will be used to verify that the work is complete and acceptable.

The scope and results of all inspection and testing activities will be recorded by CDM on the Standard Forms included in Appendix A in accordance with Section 4.0. During the inspection, the completion status of all checklist items will be recorded, and the physical conditions of the site and GWTF will be photo-documented by CDM.

All inspections and testing will be performed in accordance with Specification Sections 01451, 01780 and 01800.

7.1.1 Groundwater Treatment Facility Inspections and Acceptance

7.1.1.1 Punch-out Inspection and Testing

At the completion of all definable feature of work required for completion of the groundwater treatment system, the Construction Supervisor will conduct an inspection of all definable feature of work required for completion of the GWTF and develop a "punch list" of items which do not conform to the approved drawings and specifications. Upon completion of the inspection and adjustment or replacement of individual components and systems, the Contractor shall demonstrate that each system of related instrumentation and control equipment operate together in accordance with the Subcontract specifications. The testing shall show that the equipment operates free of excessive noise or vibration, that the equipment is responsive to manual and automatic controls, that control and protective devices are properly set, and that the equipment will operate as designed. Testing shall be performed using potable water.

The Construction Supervisor shall make a second inspection to ascertain that all identified deficiencies have been corrected. Once this is accomplished, the facility is ready for the "Pre-Final" Inspection as described in Section 7.1.1.2.

7.1.1.2 Pre-Final Inspection

Substantial completion of construction, as defined in the Subcontract documents, will be determined by CDM based upon the results of a Pre-Final Inspection. At minimum, the following representatives will be in attendance during the inspection: EPA RPM, Site Manager, Project Engineer, Construction Supervisor, Subcontractor's project manager, and Subcontractor's site superintendent. The GWTF inspection will be performed over the course of a one-day period. It will, at minimum, include a visual inspection of the work completed to determine project completeness and conformance with the Subcontract documents.

Upon completion of the Pre-Final Inspection, CDM will prepare a "punch list" of items that require correction. The list will be provided to the RA Subcontractor and the RA Subcontractor shall correct all deficiencies prior to the Final Inspection, which is described in Section 7.1.1.4. In addition, an inspection report will be prepared by CDM for submittal to EPA along with the Pre-Final Punch list as described in Section 7.2.1.

7.1.1.3 Initial Testing Program

Following Substantial Completion of construction, the RA Subcontractor must demonstrate that the treatment system meets the performance criteria specified in Specification Section 13300 of the Subcontract specifications. On-site performance will be demonstrated based upon the successful completion of a comprehensive Initial Testing Program (ITP), where the RA Subcontractor will demonstrate that the treatment system is capable of continuous operation in accordance with Specification Sections 01800 and 13300 of the Subcontract specifications. Performance verification will be based upon the results of sampling and field measurements collected during the ITP, as specified in Specification Section 01800 of the specifications. The RA

Subcontractor is responsible for making all repairs, replacements or adjustments necessary to meet the required performance criteria.

The ITP for the treatment system will take approximately two weeks to complete. The Subcontractor will complete the ITP activities in accordance with the requirements and monitoring schedule specified in Specification Section 01800 of the specifications and as directed by the Project Engineer. CDM will complete the baseline groundwater monitoring event prior to beginning the ITP.

During performance of the ITP, the Project Engineer and/or Construction Supervisor will, among other responsibilities indicated above, verify that all sampling and measurements are completed by the Subcontractor in accordance with Specification Sections 01450 and 01800 of the specifications, and the Subcontractor's approved UFP-QAPP.

If directed by EPA, CDM will direct the RA Subcontractor to continue to operate the treatment system after completion of the ITP as part of the one year operation and functional (O&F) period using operational settings selected by CDM unless the treatment system fails to meet any of the performance criteria. If such a failure occurs, CDM will direct the Subcontractor to shut down the system and submit a corrective action plan. The Site Manager would also provide notification regarding such conditions and submit a copy of the CDM-approved corrective action plan to the EPA RPM.

7.1.1.4 Final Inspection

Construction Completion for the GWTF will be determined by CDM based upon the results of a Final Inspection. At a minimum, the following representatives will be in attendance during the inspection the: EPA RPM, Site Manager, Project Engineer, Construction Supervisor, Subcontractor's project manager, Subcontractor's site superintendent, and the NYSDEC's project manager.

CDM will monitor and oversee (as necessary) the work performed by the RA Subcontractor to correct all of the items covered in the Pre-Final Inspection "punch list" prepared under Section 7.1.1.2, and any other outstanding items identified during the ITP. CDM will verify that punch list items are completed prior to final inspection of the GWTF.

EPA will conduct a final inspection of the RA to determine completeness and conformance with the requirements of the final RD specifications, the RA "as-built" drawings and specifications, and other pertinent requirements. The final inspection will include a complete walk-through of the system to determine project completeness and conformance with the final RD specifications and the "as-built" drawings and specifications. Any incomplete work items identified during the final inspection will be documented on the punch list and will be corrected by the RA Subcontractor immediately and before final payment for construction is issued. All items requiring correction will be re-inspected by CDM. CDM will prepare the inspection report documenting the results of the final inspection and the completion/resolution of all items requiring correction as described in Section 7.2.3.

7.1.1.5 Post-Final Inspection

At the completion of first year O&F period, the Post-Final Inspection will be performed to verify that all the GWTF equipment is in good condition and that all work items and deficiencies have been addressed and corrected.

At a minimum, the following representatives will be in attendance during the inspection: the EPA RPM; CDM's Site Manager, Project Engineer; and the RA Subcontractor's Project Manager. It will, at minimum, include a visual inspection of the work.

Prior to the Post-final Inspection, the RA Subcontractor will be required to submit written certification of the following:

- The Subcontract documents and RA Subcontractor-approved operation and maintenance (O&M) submittals have been reviewed.
- The work has been reviewed by the RA Subcontractor and determined to be complete in accordance with the Subcontract documents and approved O&M submittals.
- The groundwater equipment/supplies inventory and other EPA-owned items are ready for inspection by and transfer to EPA.

Upon completion of the Post-Final Inspection, CDM will prepare a "Post-Final Punch List" of items that require correction. The list will be provided to the RA Subcontractor for correction of all deficiencies immediately. All items requiring correction will be re-inspected by CDM.

7.2 Record Documentation

7.2.1 Pre-Final Inspection Report

Following completion of the GWTF Pre-Final Inspection, CDM will prepare a Pre-Final Inspection Report, which summarizes the scope and results of the inspection and includes a punch list of incomplete work items. This report will be submitted to the EPA RPM by the Site Manager.

If the results of the Pre-Final Inspection indicate that Substantial Completion of GWTF construction has been achieved, CDM will provide direction to the RA Subcontractor to initiate the ITP. If CDM determines that Substantial Completion has not been achieved, a written notification of such will be submitted to the RA Subcontractor, along with a punch list of outstanding work items that must be addressed in order to achieve Substantial Completion. Completion of punch list items will be verified and documented by CDM as part of a follow-up inspection.

7.2.2 Initial Testing Program Technical Memorandum

After conclusion of the ITP and receipt of all data collected as part of ITP, CDM will prepare a technical memorandum summarizing the performance of the treatment system during the ITP and describing the required O&M settings and procedures. The

report will summarize pre-startup conditions for evaluating remedial system progress and confirm achievement of the remedial system performance requirements.

The ITP report will be submitted to EPA for review and approval. If the sample results indicate that any performance criteria were not met, CDM will provide written notification of such results to EPA immediately, along with a schedule of corrective actions (e.g., system adjustments, supplemental ITP testing) to be implemented.

7.2.3 Final Inspection Report

Following completion of the GWTF Final Inspection, CDM will prepare a Final Inspection Report, which summarizes the scope and results of the inspection and includes a punch list of any incomplete work items, as per the work plan. This report will be submitted to the EPA RPM by the Site Manager.

If the results of the Final Inspection indicate that all of the required construction work has been completed, CDM will submit written notification of such findings to the Subcontractor. If any punch list items are identified by CDM, a written notification of such findings will be submitted to the Subcontractor, along with a punch list of outstanding work items that must be addressed in order to achieve construction completion. Completion of punch list items will be verified and documented by CDM as part of a follow-up inspection.

7.2.4 Remedial Action Reports

CDM will prepare the following documents in accordance with the requirements of EPA's Closeout Procedures for National Priority List Sites, Office of Solid Waste and Emergency Response (OSWER) Directive 9320.2-09A-P, January 2000:

- CDM will submit a draft Preliminary Close-out Report (PCOR) for review and comment by EPA, following construction completion of the GWTF. A final PCOR will be submitted following receipt of technical review comments from EPA.
- CDM will submit the draft RA Report for review and comment by EPA, following construction completion and final inspection of the GWTF. The final RA Report will be submitted following receipt of technical review comments from EPA. The report will, at minimum, include the following sections: 1) introduction, 2) site background, 3) construction activities, 4) chronology of events, 5) performance standards and construction quality control, 6) final inspection and certifications, 7) summary of project costs, 8) proposed GWTF operation, maintenance, and monitoring, 9) observations and lessons learned, and 10) contact information.

Section 8

References

CDM. 2006. Construction Observation Guidelines for Project Representatives (QPM-2A). April 3.

_____. 2008. Quality Management Process Manual No. 2 for Engineer Services During Construction (QPM-2). November 17.

_____. 2009. Final Remedial Design, Old Roosevelt Field Contaminated Groundwater Area Site. September 18.

_____. 2010. Draft Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP). March 19.

EPA. 1986. Construction Quality Assurance for Hazardous Waste Land Disposal Facilities. October.

_____. 2007. Record of Decision, Old Roosevelt Field Contaminated Groundwater Area Site. September 28.

Figures

Figure 2-1
Project Organization
Construction Quality Assurance Plan
Old Roosevelt Field Contaminated Groundwater Area Site
Garden City, New York

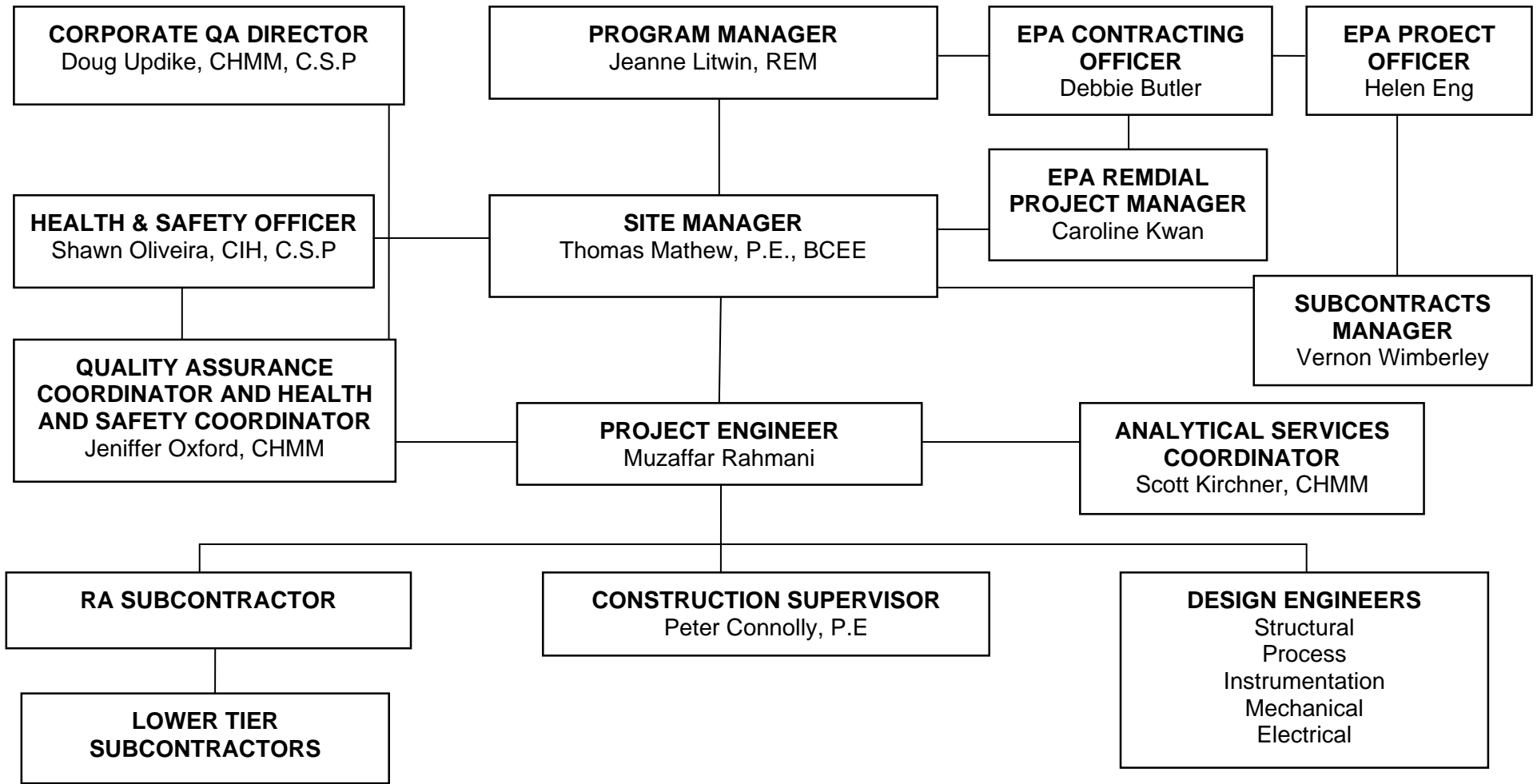
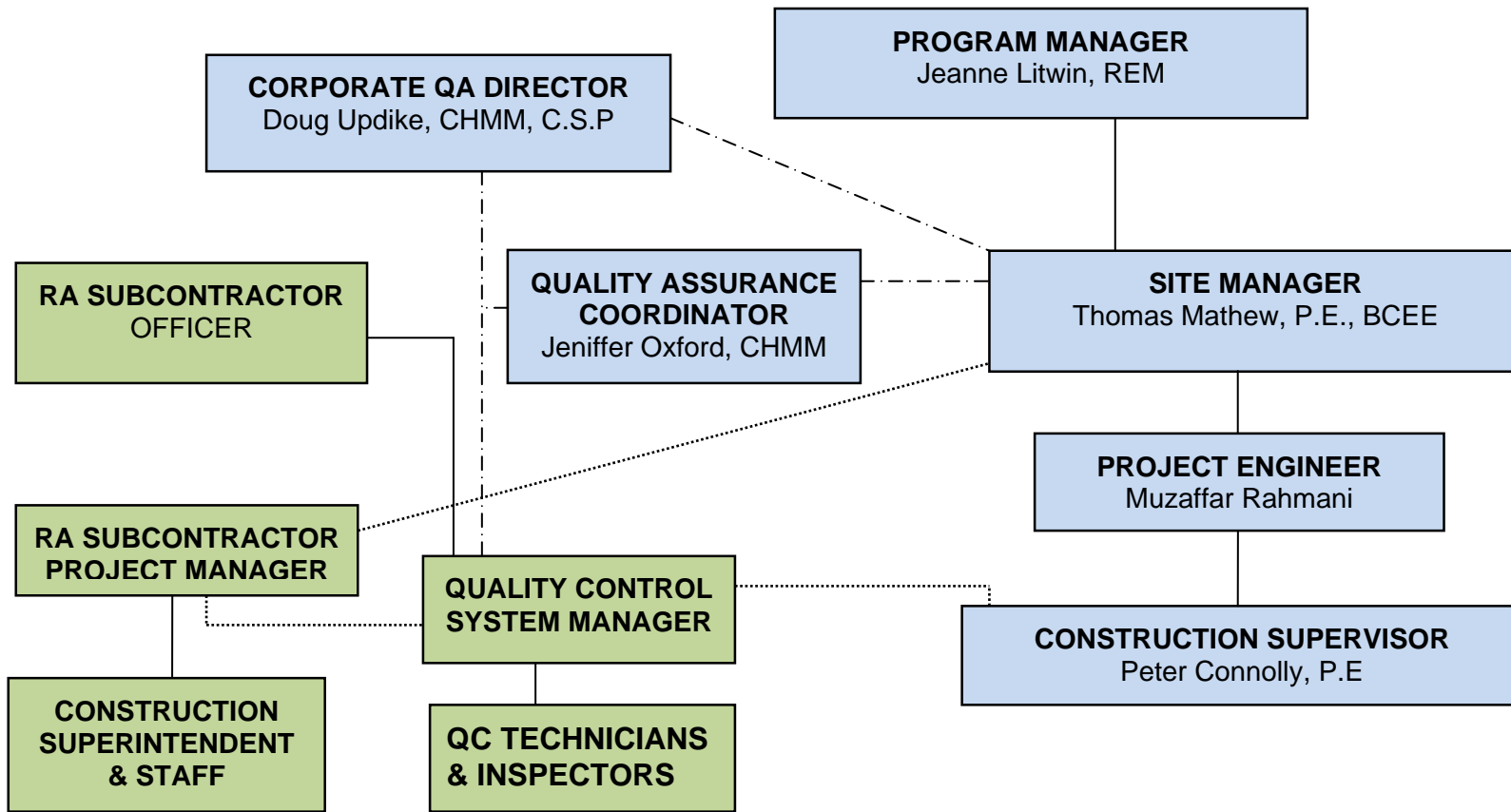
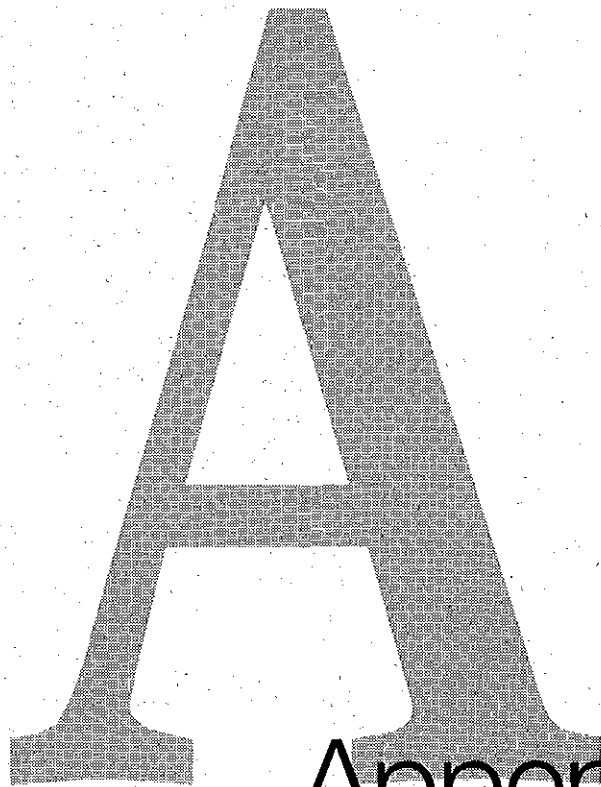


Figure 2-2
Construction Quality Assurance/Quality Control Organization
Old Roosevelt Field Contaminated Groundwater Area Site
Garden City, New York



LEGEND

- · — · — Direct communication and Coordination Related to Construction QA/QC Plan
- Direct communication and Coordination Related to Technical Issues and Contract Conformance
- CDM Organization
- RA Treatment System Subcontractor Organization



Appendix A

Appendix A

Standard Forms

- Contract Submittal Review
- Daily Status Report
- Inspection Log
- Punch List of Discrepant Items
- Punch List of Non-conforming Items
- Report of Field Correction
- Repair/Use As-Is Memorandum
- Non-Conformance Memorandum
- Request for Information
- Field Order
- Work Change Directive
- Change Order
- Photo Log
- Submittal Tracking Log



110 Fieldcrest Avenue
Edison, NJ 08837
Phone: 732-225-7000 Fax: 732-225-7851

SUBCONTRACT NO: 3320-023-XXX-XXX

CONTRACT SUBMITTAL REVIEW

Transmittal No.:

PROJECT: Old Roosevelt Field Site

DATE:

TO:

Submittal Description:

ATTN:

SUBMITTAL REVIEW STATUS CODE

- ☐ CODE 1 – APPROVED
 - ☐ CODE 2 – APPROVED AS NOTED
 - ☐ CODE 3 – APPROVED AS NOTED/RESUBMIT
 - ☐ CODE 4 – NOT APPROVED
 - ☐ CODE 5 – RECEIPT ACKNOWLEDGED
-

REMARKS:

Reviewed by: _____

Type/Print Name: Thomas Mathew

Daily Status Report

PROJECT: Old Roosevelt Field Site

Date: _____

Day: _____

WEATHER: _____

TEMP: _____

WIND: _____

FIELD FORCE			
FIRM NAME/PERSONNEL ONSITE			
VISITORS			
TIME	NAME	REPRESENTING	REMARKS
EQUIPMENT IN USE:			
CONSTRUCTION ACTIVITIES COMPLETED AND/OR IN PROGRESS:			
WORK BEING INSPECTED:			

Daily Status Report (Continued)

PROJECT: Old Roosevelt Field Site

JOB SAFETY. INDICATE WHAT WAS CHECKED, RESULTS, AND CORRECTIVE ACTIONS TAKEN:
TESTING PERFORMED:
PROBLEM/DELAYS/CORRECTIVE ACTION TO BE TAKEN:
GREEN REMEDIATION PRACTICES IMPLEMENTED AND QUANTITIES TRACKED:
COMMUNICATION WITH CONTRACTOR STAFF:
MEETING:
ADDITIONAL ACTIVITIES AND REMARKS:

By: _____

Title: _____

Inspection Log

PROJECT: **Old Roosevelt Field Site**

Date: _____

ACTIVITY: Piping Building Civil Mechanical Electrical

DESCRIPTION: Spec / Plate / Description

CONTRACTOR'S WORK FORCE (indicate classifications, include Subcontractor personnel)
MATERIALS OR EQUIPMENT DELIVERED
NON-CONFORMING ITEMS (Describe reason for non-conformance) Issue Memo
DISCREPANT ITEMS (Describe reason for discrepancy)
IS DISCREPANT ITME FIXED DURING WORK SHIFT (Explain) If no record on punch list
FOLLOWUP INSPECTIONS OF PREVIOUSLY REPORTED DEFICIENCIES

ITEM REJECTED: _____ ACCEPTED BY: _____
Engineer Date

Punch List of Discrepant Items

PROJECT: Old Roosevelt Field Site

Date: _____

Subcontractor: _____

Item No.	DATE ISSUED	DISCREPANT ITEM	STATUS	DATE CORRECTED

Punch List of Non-Conforming Items

PROJECT: Old Roosevelt Field Site

Subcontractor: _____

Type of Work: _____

Item No.	DATE ISSUED	NON-CONFORMING ITEMS (Check references as applicable)	ACTION TAKEN

Report of Field Correction

PROJECT: **Old Roosevelt Field Site**

Date: _____

CONTRACTOR: _____

CROSS REFERENCE TO DAILY REPORT NO. _____

INSTRUCTIONS

Whenever any corrective change is made in field construction which is at variance with the specification and drawings as originally issued, a complete detailed report shall be filed, listing the following items, so that specification or drawings storage data can be corrected.

1. Identify the problem: Indicate why originally specified construction was not used.
2. The solution: Describe, in detail, the recommended change or changes that were made, as applicable.
3. Indicate whether this is an isolated case or a general condition which could be improved by changing future specifications or drawings.
4. Submit sketches as necessary.

REFERENCE DATA

SPECIFICATION SECTION NO. _____ PAGE NO. _____ PARAGRAPH NO. _____
DRAWING NO. _____ ENTITLED _____
SKETCH NO. _____ DATED _____ ENTITLED _____

DESCRIPTION

1. DETAILED IDENTIFICATION OF THE PROBLEM

2. DETAILED SOLUTION PROPOSED OR ACCOMPLISHED

3. IS THE PROBLEM AN ISOLATED CASE OR GENERAL?

4. SUBMIT SKETCHES AS NECESSARY

(ATTACH EXTRA SHEETS AS NECESSARY)

BY: _____ TITLE: _____

Repair/Use As-Is Memorandum

PROJECT: **Old Roosevelt Field Site**

TO: _____

DATE: _____

TIME: _____

NUMBER: _____

SUBCONTRACTOR: _____

You are hereby notified that _____ tests _____ inspection _____ materials referenced in Nonconformance

Memorandum No. _____ are to be _____ Used-As-Is _____ Repaired to perform its intended use as
specified in Section _____ Paragraph _____ under the provisions of the Contract

Document.

It shall be your responsibility to determine and complete a corrective action necessary to conform to the provisions under the Contract Documents.

CDM Site Manager

Repair / Use-As-IS Memorandum was received by the Subcontractor on _____
Date

By _____

Title _____

Organization _____

Nonconformance Memorandum

PROJECT: **Old Roosevelt Field Site**

TO: _____

DATE: _____

TIME: _____

CONTRACTOR: _____

SUB-CONTRACTOR: _____

You are hereby notified that _____ tests _____ inspection that the

does not conform to the requirements of the Contract Documents. The provision violated is :

Section _____ Paragraph _____ under the provisions of the Contract Documents.

Noncomplying work may be required to be removed and replaced at no cost to the Engineer/Government.

It shall be your responsibility to determine corrective action necessary, and to determine whether you wish to discontinue operations until additional investigations by the Engineer confirm or refute the initial findings.

Construction Supervisor

Non-compliance Memorandum was received by the Contractor on

Date

BY _____

Title _____

Organization _____

Request for Information

PROJECT: **Old Roosevelt Field Site**

Date: _____

Subcontractor: _____

RFI #: _____

Subcontract No.: _____

To: _____

How: Mail _____ Fax _____ E-mail _____

From: _____

[illegible]

DISTRIBUTION:

By: _____ Title: _____

Field Order

No.: _____

Project: Old Roosevelt Field Site	Project No.:
To:	Date:
	Subcontract No.:
	Subcontract Date:
Re:	
By:	
To Contractor:	
This field order is issued to interpret/clarify the Contract Documents, or order minor changes in the work. The work described by this Field Order is to be accomplished without change in Contract Price, Contract Time, and/or claims with other costs.	
Description:	
Attachments:	
References:	
Engineer:	Subcontractor:
By:	By:
Date:	Date:

Work Change Directive

No.: _____

Project: Old Roosevelt Field Site	Date of Issuance:
Subcontractor:	Subcontract No.:
Engineer: CDM	Project No.:
You are directed to make the following changes in the Contract Documents:	
Description:	
Purpose of Change Order:	
Attachments (list documents supporting change):	
If a claim is made that the above change(s) have affected Contract Price or Contract Time, any claim for a Change Order based thereon will involve one of the following methods of determining the effect of the change(s).	
Method of determining change in Contract Price: <input type="checkbox"/> Time and Materials <input type="checkbox"/> Unit Prices <input type="checkbox"/> Cost Plus Fixed Fee <input type="checkbox"/> Other (Specify) ____	Method of determining change in Contract Time: <input type="checkbox"/> Contractor's Records <input type="checkbox"/> Engineer's Records <input type="checkbox"/> Other (Specify) ____
Estimated increase (decrease) in Contract Price: \$ _____. If the change involves an increase, the estimated amount is not to be exceeded without further authorization.	Estimated increase (decrease) in Contract Time: _____ days. If the change involves an increase, the estimated time is not to be exceeded without further authorization.
Once the work covered by this directive is completed or final cost and time determined, the Contractor should submit documentation for inclusion in a Change Order.	
<i>This is a directive to proceed with a change that may affect the contract price or the contract time. A change order, if any, should be considered promptly.</i>	

Authorized By: _____
 _____ Engineer

Accepted By: _____
 _____ Subcontractor _____ Date

Change Order

No.: _____

Project: Old Roosevelt Field Site	Date of Issuance:
Subcontractor:	Subcontract No.:
Engineer: CDM	Project No.:
You are directed to make the following changes in the Contract Documents:	
Description:	
Purpose of Change Order:	
Attachments (list documents supporting change):	

Change Order

No.: _____

Change in Contract Price:	Change in Contract Time:
Original Contract Price	Original Contract Time
\$	
	Days or Dates
Previous Change Order No. _____ to No. _____	Net Change from Previous Change Orders
\$	
	Days
Contract Price Prior to This Change Order	Contract Time Prior to This Change Order
\$	
	Days or Dates
Net Increase (Decrease) of This Change Order	Net Increase (Decrease) of This Change Order
\$	
	Days or Dates
Contract Price with all Approved Change Orders	Contract Time with all Approved Change Orders
\$	
	Days or Dates

This change order includes not only all direct costs of the Subcontractor such as labor, materials, job overhead, and profit markup, but also includes any costs for modifications or changes in sequence of work to be performed, delays, rescheduling, disruptions, extended direct or general overhead, acceleration, material, or other escalation, which includes wages and other impact costs.

Approved By: _____
Engineer

Approved By: _____
Subcontractor

PHOTOLOG

PROJECT: OLD ROOSEVELT FIELD SITE

CAMERA # _____

Photograph #	Description	Date/Time	Photographer

Submittal Tracking Log

7/19/2010

Project Name: Old Roosevelt Field Site

##	Submittal No.	Item No.	Description	In Date	Reviewer(s)	Out Date	Rev. Code
----	---------------	----------	-------------	---------	-------------	----------	-----------

Review Code:

Code 1: Approved

Code 2: Approved as Noted

Code 3: Approved as Noted/Resubmit

Code 4: Not Approved

Code 5: Reciept Acknowleged

□

B

Appendix
B

Appendix B
Construction Submittal Schedule

TITLE AND LOCATION: OLD ROOSEVELT FIELD SUPERFUND SITE, GARDEN CITY, NASSAU COUNTY, NY															CONTRACTOR		
N A S S A U C O U N T Y	I T E M N U M B E R	SPECS PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL											CLASSIFICATION		R E V I E W E R
				P R E C O N S T R U C T I O N S	S H O P D R A W I N G S	P R O D U C T D A T A	S A M P L E S	D E S I G N D A T A	T E S T R E P O R T S	C E R T I F I C A T E S	M F R S I N S T R U C T I O N S	M F R S I F I E L D R E P O R T S	O & M D A T A	C L O S E O U T S U B M I T T A L	I N F O R M A T I O N O N L Y	E N G I N E E R A P P R O V E D	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
		01201--1.5.1	Conference Meeting Minutes			x										x	
		01202--1.3.1	Project Progress Meeting Minutes			x										x	
		01310--1.2.1	Project Organizational Chart	x												x	
		01310--1.2.2	Project Manager Name and Experience	x												x	
		01320--1.3.1	Initial Project Schedule	x												x	
		01320--1.3.2	Revised Project Schedule	x												x	
		01351--1.3.1	Site Safety and Health Plan	x												x	
		01351--1.3.2	Weekly Safety and Accident Reports			x									x		
		01351--1.3.3	Air Monitoring Data			x									x		
		01351--1.3.4	Personnel Health and Safety Certificates							x					x		
		01351--1.3.5	Safety and Health Manager Statements							x					x		
		01351--1.3.6	Certificate of Worker/Visitor Acknowledgement							x					x		
		01351--1.3.7	Project Safety and Health Phase-Out Report											x	x		
		01355--1.3.1	Environmental Protection Plan	x												x	
		01380--1.2.1	Project Photographs			x									x		
		01450--1.3.1	Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP)	x												x	

TITLE AND LOCATION: OLD ROOSEVELT FIELD SUPERFUND SITE, GARDEN CITY, NASSAU COUNTY, NY															CONTRACTOR		
N A S S A U C O U N T Y C O D E	I T E M N U M B E R	SPECS PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL											CLASSIFICATION		R E V I E W E R
				P R E C O N S T S U B M I T T A L	S H O P D R A W I N G S	P R O D U C T D A T A	S A M P L E S	D E S I G N D A T A	T E S T R E P O R T S	C E R T I F I C A T E S	M F R S I N S T R U C T I O N S	M F R S F I E L D R E P O R T S	O & M D A T A	C L O S E O U T S U B M I T T A L	I N F O R M A T I O N O N L Y	E N G I N E E R A P P R O V E D	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
		01450--1.3.2	ANSETS Data Requirement Form and Trip Report						x						x		
		01450--1.3.3	Topsoil Material Testing Results						x							x	
		01450--1.3.4	Analytical Data						x							x	
		01450--1.3.5	Non-Conformance Reports						x						x		
		01450--1.3.6	Chemical Data Final Report (CDFR)						x							x	
		01451--1.3.1	CQC Plan	x												x	
		01451--1.3.2	CQC Organizational Changes			x										x	
		01451--1.3.3	CQC Reports			x									x		
		01500--1.2.1	Temporary Site Facility Layout Plan		x											x	
		01550--1.2.1	Surveyor Qualifications			x									x		
		01550--1.2.2	Surveyor Accuracy Documentation			x									x		
		01550--1.2.3	Surveyor Field Notes			x									x		
		01550--1.2.4	As-Built Drawings											x		x	
		01780--1.3.1	Interim Remedial Action (RA) Report											x		x	
		01800--1.2.1	Notification of Maintenance Activities										x		x		
		01800--1.2.2	Monthly Operating Logs										x		x		
		01800--1.2.3	Initial Testing Program (ITP) Report						x						x		
		01800--1.2.4	Quarterly Remedial Progress Reports						x						x		

TITLE AND LOCATION: OLD ROOSEVELT FIELD SUPERFUND SITE, GARDEN CITY, NASSAU COUNTY, NY															CONTRACTOR		
N A S S A U C O U N T Y C O D E	I T E M N U M B E R	SPECS PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL											CLASSIFICATION		R E V I E W E R
				P R E C O N S T S U B M I T T A L	S H O P D R A W I N G S	P R O D U C T D A T A	S A M P L E S	D E S I G N D A T A	T E S T R E P O R T S	C E R T I F I C A T E S	M F R S I N S T R U C T I O N S	M F R S I E L D R E P O R T S	O & M D A T A	C L O S E O U T S U B M I T T A L	I N F O R M A T I O N O N L Y	E N G I N E E R A P P R O V E D	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
		01800--1.2.5	Computerized Recordkeeping System										X			X	
		01800--1.2.6	Optimization Report						X						X		
		01850--1.3.1	System O&M Manual										X			X	
		01850--1.3.2	User Startup Training and Instruction Schedule	X												X	
		01850--1.3.3	Proposed Changes to the O&M Manual										X			X	
		01851--1.2.1	Chemical Additives and Agents			X										X	
		01851--1.2.2	Extraction Well Testing Results						X						X		
		02100--1.3.1	Site Preparation Plan	X												X	
		02100--1.3.2	Crushed Stone Aggregate Certificates of Compliance							X					X		
		02100--1.3.3	Geotextile Filter Fabric Certificates of Compliance							X					X		
		02100--1.3.4	Permits							X					X		
		02120--1.3.1	Transportation Plan	X												X	
		02120--1.3.2	Notice of Non-Compliance and Notice of Violation			X									X		
		02120--1.3.3	Transport Certification							X					X		
		02120--1.3.4	Annual and Biennial Reports						X							X	
		02120--1.3.5	Shipping Documents and Packaging Certification							X						X	

TITLE AND LOCATION: OLD ROOSEVELT FIELD SUPERFUND SITE, GARDEN CITY, NASSAU COUNTY, NY															CONTRACTOR		
N A S S A U C O U N T Y C O D E	I T E M N U M B E R	SPECS PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL											CLASSIFICATION		R E V I E W E R
				P R E C O N S T S U B M I T T A L	S H O P D R A W I N G S	P R O D U C T D A T A	S A M P L E S	D E S I G N D A T A	T E S T R E P O R T S	C E R T I F I C A T E S	M F R S I N S T R U C T I O N S	M F R S F I E L D R E P O R T S	O & M D A T A	C L O S E O U T S U B M I T T A L	I N F O R M A T I O N O N L Y	E N G I N E E R A P P R O V E D	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
		02120--1.3.6	EPA Off-Site Policy							x					x		
		02120--1.3.7	Certificates of Disposal							x					x		
		02120--1.3.8	Disposal Facility Names and Permits	x												x	
		02300--1.3.1	Excavation, Trenching, and Backfill Plan	x												x	
		02300--1.3.2	Laboratory and Field Test Results						x						x		
		02300--1.3.3	Earthen Materials Certificates of Compliance							x					x		
		02370--1.3.1	Soil Erosion and Sediment Control Plan	x												x	
		02370--1.3.2	Samples				x									x	
		02370--1.3.3	Permits							x					x		
		02510--1.3.1	Valves		x											x	
		02510--1.3.2	Material List			x										x	
		02510--1.3.3	Satisfactory Installation			x										x	
		02510--1.3.4	Certificates of Compliance							x					x		
		02510--1.3.5	Hydrostatic Testing and Disinfection						x							x	
		02510--1.3.6	Installation Instructions								x				x		
		02576--1.3.1	Certified Mix Designs	x												x	
		02576--1.3.2	Certified Test Results for Gravel Gradation					x							x		
		02821--1.3.1	Fencing		x											x	
		02821--1.3.2	Material Certificates							x					x		

TITLE AND LOCATION: OLD ROOSEVELT FIELD SUPERFUND SITE, GARDEN CITY, NASSAU COUNTY, NY															CONTRACTOR		
N A S S A U C O U N T Y C O D E	I T E M N U M B E R	SPECS PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL											CLASSIFICATION		R E V I E W E R
				P R E C O N S T S U B M I T T A L	S H O P D R A W I N G S	P R O D U C T D A T A	S A M P L E S	D E S I G N D A T A	T E S T R E P O R T S	C E R T I F I C A T E S	M F R S I N S T R U C T I O N S	M F R S F I E L D R E P O R T S	O & M D A T A	C L O S E O U T S U B M I T T A L	I N F O R M A T I O N O N L Y	E N G I N E E R A P P R O V E D	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
		02900--1.3.1	Material Certificates							x						x	
		03100--1.3.1	Detail Drawings		x											x	

TITLE AND LOCATION: OLD ROOSEVELT FIELD SUPERFUND SITE, GARDEN CITY, NASSAU COUNTY, NY															CONTRACTOR		
N A S S A U C O U N T Y C O D E	I T E M N U M B E R	SPECS PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL											CLASSIFICATION		R E V I E W E R
				P R E C O N S T S U B M I T T A L	S H O P D R A W I N G S	P R O D U C T D A T A	S A M P L E S	D E S I G N D A T A	T E S T R E P O R T S	C E R T I F I C A T E S	M F R S I N S T R U C T I O N S	M F R S F I E L D R E P O R T S	O & M D A T A	C L O S E O U T S U B M I T T A L	I N F O R M A T I O N O N L Y	E N G I N E E R A P P R O V E D	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
		03100--1.3.2	Form Design			X										X	
		03100--1.3.3	Form Materials			X										X	
		03100--1.3.4	Form Releasing Agents				X									X	
		03100--1.3.5	Form Releasing Agents								X				X		
		03100--1.3.6	Certificates							X					X		
		03150--1.3.1	Product Data			X										X	
		03150--1.3.2	Certifications							X					X		
		03200--1.3.1	Reinforcing Steel Shop Drawings		X											X	
		03200--1.3.2	Mill Test Reports						X							X	
		03200--1.3.3	Welder's Certification							X					X		
		03300--1.3.1	Mixture Proportions			X										X	
		03300--1.3.2	Testing and Inspection for Contractor Quality Control						X						X		
		03300--1.3.3	Qualifications, Manufacturer's Certification							X					X		
		03410--1.3.1	Shop Drawings		X											X	
		03410--1.3.2	Design Data						X							X	
		03410--1.3.3	Test Reports						X							X	
		03410--1.3.4	Material Certificates							X					X		

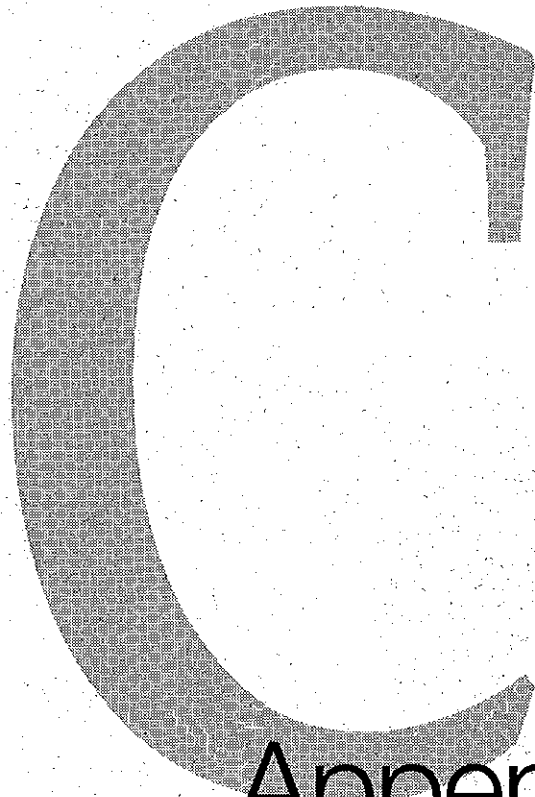
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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
		03410--1.3.5	Compliance Certificates							x					x		
		11319--1.3.1	Pump Selection Calculations and Performance Data		x											x	
		11319--1.3.2	Manufacturer's Installation Instructions								x				x		
		11319--1.3.3	Manufacturer's Descriptive Data			x									x		
		11319--1.3.4	Technical Literature			x									x		
		11319--1.3.5	Manufacturer's Certified Pump Curve			x									x		
		11319--1.3.6	Corrosion Protection Certificate							x					x		
		11319--1.3.7	O&M Manual					x							x		
		13122--1.2.1	Building Layout Drawings	x												x	
		13122--1.2.2	Structural Drawings and Specifications	x												x	
		13122--1.2.3	HVAC, Plumbing, and Fire Protection Drawings and Specifications	x												x	
		13122--1.2.4	Shop Drawings		x											x	
		13122--1.2.5	Color Samples				x									x	
		13122--1.2.6	P.E. Certification							x					x		
		13122--1.2.7	Erection Drawings		x											x	
		13122--1.2.8	Manufacturer's Certifications							x					x		

TITLE AND LOCATION: OLD ROOSEVELT FIELD SUPERFUND SITE, GARDEN CITY, NASSAU COUNTY, NY															CONTRACTOR		
N A S S A U C O U N T Y C O D E	I T E M N U M B E R	SPECS PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL											CLASSIFICATION		R E V I E W E R
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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
		13122--1.2.9	Warranty							x					x		
		13122--1.2.10	Sanitary Waste Holding Tank Permit							x					x		
		13300--1.2.1	Pilot Testing Plan	x												x	
		13300--1.2.2	Groundwater Treatment Plan	x												x	
		13300--1.2.2.1	Groundwater Treatment Equipment			x										x	
		13300--1.2.2.2	Process Flow and Instrumentation Diagrams		x											x	
		13300--1.2.2.3	Plan and Cross-Sectional View of Treatment System Layout		x											x	
		13300--1.2.5	Equipment Certificates							x					x		
		13300--1.2.6	Calculations					x								x	
		13300--1.2.7	Test Reports						x							x	
		13300--1.2.8	Warranty							x					x		
		13300--1.2.9	Hardware and Software Design					x								x	
		15200--1.3.1	Shop Drawings		x											x	
		15200--1.3.2	Product Data			x										x	
		15200--1.3.3	Statements of Satisfactory Installation and Thrust Restraint Methods						x						x		
		15200--1.3.4	Equipment Samples as Appropriate				x								x		

TITLE AND LOCATION: OLD ROOSEVELT FIELD SUPERFUND SITE, GARDEN CITY, NASSAU COUNTY, NY															CONTRACTOR		
N A S S A U C O U N T Y C O D E	I T E M N U M B E R	SPECS PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL											CLASSIFICATION		R E V I E W E R
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a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
		15200--1.3.5	Design Data and Assumptions					x								x	
		15200--1.3.6	Certified Shop Tests							x					x		
		15200--1.3.7	Performance Testing						x						x		
		15200--1.3.8	Certification							x					x		
		15200--1.3.9	Manufacturer's Certification							x					x		
		15200--1.3.10	Equipment/System Warranty							x					x		
		16000--1.3.1	Shop Drawings		x											x	
		16000--1.3.2	Manufacturer's Product Information			x										x	
		16000--1.3.3	Electrical Installation Drawings		x											x	
		16000--1.3.4	Test Reports						x						x		
		16110--1.2.1	Product Data			x									x		
		16110--1.2.2	Samples				x								x		
		16191--1.2.1	Catalog Information			x										x	
		16220--1.3.1	Motor Data			x										x	
		16220--1.3.2	Dimension Drawings		x											x	
		16220--1.3.3	Equipment Guarantee							x					x		
		16220--1.3.4	Equipment Warranty							x					x		

TITLE AND LOCATION: OLD ROOSEVELT FIELD SUPERFUND SITE, GARDEN CITY, NASSAU COUNTY, NY															CONTRACTOR		
N A S S A U C O U N T Y C O D E	I T E M N U M B E R	SPECS PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL											CLASSIFICATION		R E V I E W E R
				P R E C O N S T S U B M I T T A L	S H O P D R A W I N G S	P R O D U C T D A T A	S A M P L E S	D E S I G N D A T A	T E S T R E P O R T S	C E R T I F I C A T E S	M F R S I N S T R U C T I O N S	M F R S F I E L D R E P O R T S	O & M D A T A	C L O S E O U T S U B M I T T A L	I N F O R M A T I O N O N L Y	E N G I N E E R A P P R O V E D	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
		16261--1.3.1	Shop Drawings		x											x	
		16261--1.3.2	Equipment Data			x										x	
		16261--1.3.3	Test Reports						x						x		
		16261--1.3.4	Manufacturer's Instructions								x				x		
		16261--1.3.5	Manufacturer's Field Reports									x			x		
		16261--1.3.6	Equipment Warranty							x					x		
		16375--1.4.1	Manufacturer's Catalog Data			x										x	
		16375--1.4.2	Material, Equipment, and Fixtures List			x										x	
		16375--1.4.3	Electrical Distribution System Drawings		x											x	
		16375--1.4.4	Factory Test						x						x		
		16375--1.4.5	Field Testing Plan						x							x	
		16375--1.4.6	Test Reports						x							x	
		16375--1.4.7	Materials and Equipment Certificates							x						x	
		16402--1.3.1	Manufacturer's Catalog			x										x	
		16402--1.3.2	Material, Equipment, and Fixtures Lists			x										x	
		16402--1.3.3	Installation Procedures			x										x	
		16402--1.3.4	Interior Electrical Equipment Drawings		x											x	
		16402--1.3.5	Structural Drawings		x											x	
		16402--1.3.6	Electrical Drawings		x											x	

TITLE AND LOCATION: OLD ROOSEVELT FIELD SUPERFUND SITE, GARDEN CITY, NASSAU COUNTY, NY															CONTRACTOR		
N A S S A U C O U N T Y C O D E	I T E M N U M B E R	SPECS PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL											CLASSIFICATION		R E V I E W E R
				P R E C O N S T S U B M I T T A L	S H O P D R A W I N G S	P R O D U C T D A T A	S A M P L E S	D E S I G N D A T A	T E S T R E P O R T S	C E R T I F I C A T E S	M F R S I N S T R U C T I O N S	M F R S F I E L D R E P O R T S	O & M D A T A	C L O S E O U T S U B M I T T A L	I N F O R M A T I O N O N L Y	E N G I N E E R A P P R O V E D	
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
		16402--1.3.7	Onsite Test						x							x	
		16402--1.3.8	Factory Test Reports						x							x	
		16402--1.3.9	Field Test Plan						x							x	
		16402--1.3.10	Field Test Reports						x							x	
		16402--1.3.11	Materials and Equipment Certificates							x						x	
		16502--1.3.1	Lighting Protection System		x											x	
		16502--1.3.2	Lighting Protection System					x								x	
		16600--1.4.1	Shop Drawings		x											x	
		16600--1.4.2	Product Data			x										x	
		16660--1.3.1	Shop Drawings		x											x	
		16660--1.3.2	Product Data			x										x	
		16660--1.3.3	Test Results						x							x	
		16742--1.4.1	Shop Drawings		x											x	
		16742--1.4.2	Spare Parts			x										x	
		16742--1.4.3	Manufacturer's Recommendations							x						x	
		16742--1.4.4	Test Plan						x							x	
		16742--1.4.5	Qualifications	x												x	
		16742--1.4.6	Test Reports						x						x		
		16742--1.4.7	Materials and Equipment							x					x		
		16742--1.4.8	Operation and Maintenance Data										x		x		



Appendix C

Appendix C

CDM Technical SOPs

- 4-1 Field Logbook Content and Control
- 4-2 Photographic Documentation of Field Activities

Field Logbook Content and Control

SOP 4-1
Revision: 6
Date: March 2007

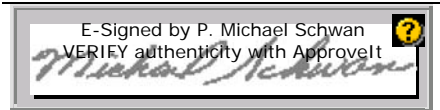
Prepared: Del Baird

Technical Review: Laura Splichal

QA Review: Jo Nell Mullins

Approved: 

Issued:



Signature/Date

Signature/Date

1.0 Objective

The objective of this standard operating procedure (SOP) is to set CDM Federal (CDM) criteria for content entry and form of field logbooks. Field logbooks are an essential tool to document field activities for historical and legal purposes.

2.0 Background

2.1 Definitions

Biota - The flora and fauna of a region.

Magnetic Declination Corrections - Compass adjustments to correct for the angle between magnetic north and geographical meridians.

2.2 Discussion

Information recorded in field logbooks includes field team names; observations; data; calculations; date/time; weather; and description of the data collection activity, methods, instruments, and results. Additionally, the logbook may contain deviations from plans and descriptions of wastes, biota, geologic material, and site features including sketches, maps, or drawings as appropriate.

3.0 General Responsibilities

Field Team Leader (FTL) - The FTL is responsible for ensuring that the format and content of data entries are in accordance with this procedure.

Site Personnel - All CDM employees who make entries in field logbooks during onsite activities are required to read this procedure before engaging in this activity. The FTL will assign field logbooks to site personnel who will be responsible for their care and maintenance. Site personnel will return field logbooks to the records file at the end of the assignment.

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities should be defined in the field plan or site-/project-specific quality assurance plan.

4.0 Required Equipment

- Site-specific plans
- Indelible black or blue ink pen
- Field logbook
- Ruler or similar scale

5.0 Procedures

5.1 Preparation

In addition to this SOP, site personnel responsible for maintaining logbooks must be familiar with all procedures applicable to the field activity being performed. These procedures should be consulted as necessary to obtain specific information about equipment and supplies, health and safety, sample collection, packaging, decontamination, and documentation. These procedures should be located at the field office or vehicle for easy reference.

Field logbooks shall be bound with lined, consecutively numbered pages. All pages must be numbered before initial use of the logbook. Before use in the field, each logbook will be marked with a specific document control number issued by

Field Logbook Content and Control

SOP 4-1
Revision: 6
Date: March 2007

the document control administrator, if required by the contract quality implementation plan (QIP). Not all contracts require document control numbers. The following information shall be recorded on the cover of the logbook:

- Field logbook document control number (if applicable).
- Activity (if the logbook is to be activity-specific), site name, and location.
- Name of CDM contact and phone number(s) (typically the project manager).
- Start date of entries.
- End date of entries.
- In specific cases, special logbooks may be required (e.g., waterproof paper for stormwater monitoring).

The first few (approximately five) pages of the logbook will be reserved for a table of contents (TOC). Mark the first page with the heading and enter the following:

Table of Contents

Date/Description (Start Date)/Reserved for TOC	Pages 1-5
---	--------------

The remaining pages of the table of contents will be designated as such with "TOC" written on the top center of each page. The table of contents should be completed as activities are completed and before placing the logbook in the records file.

5.2 Operation

Requirements that must be followed when using a logbook:

- Record work, observations, quantities of materials, calculations, drawings, and related information directly in the logbook. If data collection forms are specified by an activity-specific plan, this information does not need to be duplicated in the logbook. However, any forms used to record site information must be referenced in the logbook.
- Do not start a new page until the previous one is full or has been marked with a single diagonal line so that additional entries cannot be made. Use both sides of each page.
- Do not erase or blot out any entry at any time. Indicate any deletion by a single line through the material to be deleted. Initial and date each deletion. Take care to not obliterate what was written previously.
- Do not remove any pages from the book.

Specific requirements for field logbook entries include:

- Initial and date each page.
- Sign and date the final page of entries for each day.
- Initial and date all changes.
- Multiple authors must sign out the logbook by inserting the following:
 - Above notes authored by:
 - (Sign name)
 - (Print name)
 - (Date)
- A new author must sign and print his/her name before additional entries are made.
- Draw a diagonal line through the remainder of the final page at the end of the day.
- Record the following information on a daily basis:
 - Date and time
 - Name of individual making entry
 - Names of field team and other persons onsite
 - Description of activity being conducted including station or location (i.e., well, boring, sampling location number) if appropriate
 - Weather conditions (i.e., temperature, cloud cover, precipitation, wind direction, and speed) and other pertinent data
 - Level of personal protection used
 - Serial numbers of instruments
 - Equipment calibration information
 - Serial/tracking numbers on documentation (e.g., carrier air bills)

Field Logbook Content and Control

SOP 4-1
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Entries into the field logbook shall be preceded with the time (written in military units) of the observation. The time should be recorded frequently and at the point of events or measurements that are critical to the activity being logged. All measurements made and samples collected must be recorded unless they are documented by automatic methods (e.g., data logger) or on a separate form required by an operating procedure. In these cases, the logbook must reference the automatic data record or form.

At each station where a sample is collected or an observation or measurement made, a detailed description of the location of the station is required. Use a compass (include a reference to magnetic declination corrections), scale, or nearby survey markers, as appropriate. A sketch of station location may be warranted. All maps or sketches made in the logbook should have descriptions of the features shown and a direction indicator. It is preferred that maps and sketches be oriented so that north is toward the top of the page. Maps, sketches, figures, or data that will not fit on a logbook page should be referenced and attached to the logbook to prevent separation.

Other events and observations that should be recorded include:

- Changes in weather that impact field activities.
- Deviations from procedures outlined in any governing documents. Also record the reason for any noted deviation.
- Problems, downtime, or delays.
- Upgrade or downgrade of personal protection equipment.
- Visitors to the site.

5.3 Post-Operation

To guard against loss of data as a result of damage or disappearance of logbooks, completed pages shall be periodically photocopied (weekly, at a minimum) and forwarded to the field or project office. Other field records shall be photocopied and submitted regularly and as promptly as possible to the office. When possible, electronic media such as disks and tapes should be copied and forwarded to the project office.

At the conclusion of each activity or phase of site work, the individual responsible for the logbook will ensure that all entries have been appropriately signed and dated and that corrections were made properly (single lines drawn through incorrect information, then initialed and dated). The completed logbook shall be submitted to the records file.

6.0 Restrictions/Limitations

Field logbooks constitute the official record of onsite technical work, investigations, and data collection activities. Their use, control, and ownership are restricted to activities pertaining to specific field operations carried out by CDM personnel and their subcontractors. They are documents that may be used in court to indicate dates, personnel, procedures, and techniques employed during site activities. Entries made in these logbooks should be factual, clear, precise, and nonsubjective. Field logbooks, and entries within, are not to be used for personal use.

7.0 References

Sandia National Laboratories. 1991. *Procedure for Preparing Sampling and Analysis Plan, Site-Specific Sampling Plan, and Field Operating Procedures*, QA-02-03. Albuquerque Environmental Program, Department 3220, Albuquerque, New Mexico.

Sandia National Laboratories. 1992. *Field Operation Procedure for Field Logbook Content and Control*. Environmental Restoration Department, Division 7723, Albuquerque, New Mexico.

Photographic Documentation of Field Activities

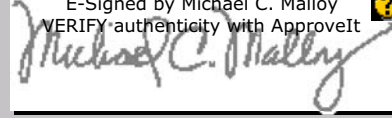
SOP 4-2
Revision: 7
Date: March 2007

Prepared: David O. Johnson

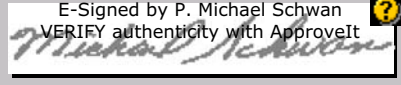
Technical Review: Sharon Budney

QA Review: Jo Nell Mullins

Approved:

E-Signed by Michael C. Malloy
VERIFY authenticity with ApproveIt


Signature/Date

E-Signed by P. Michael Schwan
VERIFY authenticity with ApproveIt


Issued:

Signature/Date

1.0 Objective

The purpose of this standard operating procedure (SOP) is to provide standard guidelines and methods for photographic documentation, which include still and digital photography and videotape or DVD recordings of field activities and site features (geologic formations, core sections, lithologic samples, water samples, general site layout, etc.). This document shall provide guidelines designed for use by a professional or amateur photographer. This SOP is intended for circumstances when formal photographic documentation is required. Based on project requirements, it may not be applicable for all photographic activities.

2.0 Background

2.1 Definitions

Photographer - A photographer is the camera operator (professional or amateur) of still photography, including digital photography, or videotape or digital versatile discs (DVD) recording whose primary function with regard to this SOP is to produce documentary or data-oriented visual media.

Identifier Component - Identifier components are visual components used within a photograph such as visual slates, reference markers, and pointers.

Standard Reference Marker - A standard reference marker is a reference marker that is used to indicate a feature size in the photograph and is a standard length of measure, such as a ruler, meter stick, etc. In limited instances, if a ruled marker is not available or its use is not feasible, it can be a common object of known size placed within the visual field and used for scale.

Slates - Slates are blank white index cards or paper used to present information pertaining to the subject/procedure being photographed. Letters and numbers on the slate will be bold and written with black indelible marking pens.

Arrows and Pointers - Arrows and pointers are markers/pointers used to indicate and/or draw attention to a special feature within the photograph.

Contrasting Backgrounds - Contrasting backgrounds are backdrops used to lay soil samples, cores, or other objects on for clearer viewing and to delineate features.

Data Recording Camera Back - A data recording camera back is a camera attachment or built-in feature that will record, at the very least, frame numbers and dates directly on the film.

2.2 Associated Procedures

- CDM Federal SOP 4-1, *Field Logbook Content and Control*

2.3 Discussion

Photographs and videotape or DVD recordings made during field investigations are used as an aid in documenting and describing site features, sample collection activities, equipment used, and possible lithologic interpretation. This SOP is designed to illustrate the format and desired placement of identifier components, such as visual slates, standard

reference markers, and pointers. These items shall become an integral part of the “visual media” that, for the purpose of this document, shall encompass still photographs, digital photographs, videotape recordings (or video footage), and recordings on DVDs. The use of a photographic logbook and standardized entry procedures are also outlined. These procedures and guidelines will minimize potential ambiguities that may arise when viewing the visual media and ensure the representative nature of the photographic documentation.

3.0 General Responsibilities

Field Team Leader - The field team leader (FTL) is responsible for ensuring that the format and content of photographic documentation are in accordance with this procedure. The FTL is responsible for directing the photographer to specific situations, site features, or operations that the photographer will be responsible for documenting.

Photographer - The photographer shall seek direction from the FTL and regularly discuss the visual documentation requirements and schedule. The photographer is responsible for maintaining a logbook per Sections 5.1, 5.2.4, and 5.3.1 of this SOP. Responsibilities will be defined in the project sampling plan.

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site/quality assurance project plan (QAPP).

4.0 Required Equipment

A general list of equipment that may be used:

- 35mm camera or disposable single use camera (35mm or panoramic use)
- Digital camera
- Extra batteries for 35mm camera
- Video camera and appropriate storage media (e.g., video tapes, DVDs)
- Logbook
- Indelible black or blue ink pen
- Standard reference markers
- Slates
- Arrows or pointers
- Contrasting backgrounds
- Medium speed, or multi purpose fine-grain, color, 35mm negative film or slide film (project dependent)
- Data recording camera back (if available)
- Storage medium for digital camera

5.0 Procedures

5.1 Documentation

A commercially available, bound logbook will be used to log and document photographic activities. Review CDM Federal SOP 4-1, *Field Logbook Content and Control* and prepare all supplies needed for logbook entries.

Note: A separate photographic logbook is not required. A portion of the field logbook may be designated as the photographic log and documentation section.

Field Health and Safety Considerations

There are no hazards that an individual will be exposed to specific to photographic documentation. However, site-specific hazards may arise depending on location or operation. Personal protective equipment used in this operation will be site-specific and dictated through requirements set by the site safety officer, site health and safety plan, and/or prescribed by the CDM Federal Corporate Health and Safety Program. The photographer should contact the site safety officer for health and safety orientation before commencing field activities. The site health and safety plan must be read before entry to the site, and all individuals must sign the appropriate acknowledgement that this has been done.

The photographer should be aware of any potential physical hazards while photographing the subject (e.g., traffic, low overhead hazard, edge of excavation).

5.2 Operation

5.2.1 General Photographic Activities in the Field

The following sections provide general guidelines that should be followed to visually document field activities and site features using still/digital cameras and video equipment. Listed below are general suggestions that the photographer should consider when performing activities under this SOP:

- The photographer should be prepared to make a variety of shots, from close-up to wide-angle. Many shots will be repetitive in nature or format, especially close-up site feature photographs. Consideration should therefore be given to designing a system or technique that will provide a reliable repetition of performance.
- All still film photographs should be made using a medium speed, or multi purpose fine-grain, color negative film in the 35mm format unless otherwise directed by the FTL.
- It is suggested that Kodak brand "Ektapress Gold Deluxe" film or equivalent be used as the standard film for the still photography requirements of the field activities. This film is stable at room temperature after exposure and will better survive the time lag between exposure and processing. It is suggested that film speed ASA 100 should be used for outdoor photographs in bright sunlight, ASA 200 film should be used in cloudy conditions, and ASA 400 film should be used indoors or for very low-light outdoor photographs.
- No preference of videotape or DVD brand along with digital storage medium is specified and is left to the discretion of the photographer.
- The lighting for sample and feature photography should be oriented toward a flat condition with little or no shadow. If the ambient lighting conditions are inadequate, the photographer should be prepared to augment the light (perhaps with reflectors or electronic flash) to maintain the desired visual effect.
- Digital cameras have multiple photographic quality settings. A camera that obtains a higher resolution (quality) has a higher number of pixels and will store a fewer number of photographs per digital storage medium.

5.2.2 General Guidelines for Still Photography

Slate Information

It is recommended that each new roll of film or digital storage medium shall contain on the first usable frame (for film) a slate with consecutively assigned control numbers (a consecutive, unique number that is assigned by the photographer as in sample numbers).

Caption Information

All still photographs will have a full caption permanently attached to the back or permanently attached to a photo log sheet. The caption should contain the following information (digital photographs should have a caption added after the photographs are downloaded):

- | | |
|---|---|
| ■ Film roll control number (if required) and photograph sequence number | ■ Description of activity/item shown (e.g., name of facility/site, specific project name, project number) |
| ■ Date and time | ■ Direction (if applicable) |
| ■ Photographer | |

When directed by the sampling plan, a standard reference marker should be used in all documentary visual media. While the standard reference marker will be predominantly used in close-up feature documentation, inclusion in all scenes should be considered.

Digital media should be downloaded at least once each day to a personal computer; the files should be in either "JPEG" or "TIFF" format. Files should be renamed at the time of download to correspond to the logbook. It is recommended the electronic files be copied to a compact disc for backup.

Close-Up and Feature Photography

When directed by the sampling plan, close-up photographs should include a standard reference marker of appropriate size as an indication of the feature size and contain a slate marked with the site name and any identifying label, such as a well number or core depth, that clearly communicates to the viewer the specific feature being photographed.

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Feature samples, core pieces, and other lithologic media should be photographed as soon as possible after they have been removed from their in situ locations. This enables a more accurate record of their initial condition and color. When directed by the sampling plan, include a standard reference color strip (color chart such as Munsell Soil Color Chart or that available from Eastman Kodak Co.) within the scene. This is to be included for the benefit of the viewer of the photographic document and serves as a reference aid to the viewer for formal lithologic observations and interpretations.

Site Photography

Site photography, in general, will consist predominantly of medium- and wide-angle shots. A standard reference marker should be placed adjacent to the feature or, when this is not possible, within the same focal plane.

While it is encouraged that a standard reference marker and caption/slate be included in the scene, it is understood that situations will arise that preclude their inclusion within the scene. This will be especially true of wide-angle shots. In such a case, the film/tape control number shall be entered in the photographic logbook along with the frame number and all other information pertinent to the scene.

Panoramic

In situations where a wide-angle lens does not provide sufficient subject detail, a single-use disposable panoramic camera is recommended. If this type of camera is not available, a panoramic series of two or three photos would be appropriate. Panoramas can provide greater detail while covering a wide subject, such as an overall shot of a site.

To shoot a panoramic series using a standard 35mm or digital camera, the following procedures are recommended:

- Use a stable surface or tripod to support the camera
- Allow a 20- to 30-percent overlap while maintaining a uniform horizon
- Complete two to three photos per series

5.2.3 General Photographic Documentation Using Video Cameras

As a reminder, it is not within the scope of this document to set appropriate guidelines for presentation or "show" videotape or DVD recording. The following guidelines are set for documentary videotape or DVD recordings only and should be implemented at the discretion of the site personnel.

Documentary videotape or DVD recordings of field activities may include an audio slate for all scenes. At the beginning of each video session, an announcer will recite the following information: date, time (in military units), photographer, site ID number, and site location. This oral account may include any additional information clarifying the subject matter being recorded.

A standard reference marker may be used when taking close-up shots of site features with a video camera. The scene may also include a caption/slate. It should be placed adjacent and parallel to the feature being photographed.

It is recommended that a standard reference marker and caption/slate be included in all scenes. The caption information is vital to the value of the documentary visual media and should be included. If it is not included within the scene, it should be placed before the scene.

Original video recordings will not be edited. This will maintain the integrity of the information contained on the videotape or DVD. If editing is desired, a working copy of the original video recording can be made.

A label should be placed on the videotape or DVD with the appropriate identifying information (project name, project number, date, location, etc.).

5.2.4 Photographic Documentation

Photographic activities must be documented in a photographic logbook or in a section of the field logbook. The photographer will be responsible for making proper entries.

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In addition to following the technical standards for logbook entry as referenced in CDM Federal SOP 4-1, the following information should be maintained in the appropriate logbook:

- Photographer name.
- If required, an entry shall be made for each new roll/tape/DVD control number assigned.
- Sequential tracking number for each photograph taken (for digital cameras, the camera-generated number may be used).
- Date and time (military time).
- Location.
- A description of the activity/item photographed.
- If needed, a description of the general setup, including approximate distance between the camera and the subject, may be recorded in the logbook.
- Record as much other information as possible to assist in the identification of the photographic document.

5.3 Post Operation

All film will be sent for development and printing to a photographic laboratory (to be determined by the photographer). The photographer will be responsible for arranging transport of the film from the field to the photographic laboratory. The photographer shall also be responsible for arranging delivery of the negatives and photographs, digital storage medium, or videotape or DVD to the project management representative to be placed in the project files.

5.3.1 Documentation

At the end of each day's photographic session, the photographer(s) will ensure that the appropriate logbook has been completely filled out and maintained as outlined in CDM Federal SOP 4-1.

5.3.2 Archive Procedures

- Photographs and the associated set of uncut negatives, digital media, and original unedited documentary video recordings will be submitted to the project files and handled according to contract records requirements. The project manager will ensure their proper distribution.
- Completed pages of the appropriate logbook will be copied weekly and submitted to the project files.

6.0 Restrictions/Limitations

This document is designed to provide a set of guidelines for the field amateur or professional photographer to ensure that an effective and standardized program of visual documentation is maintained.

It is not within the scope of this document to provide instruction in photographic procedures, nor is it within the scope of this document to set guidelines for presentation or "show" photography.

The procedures outlined herein are general by nature. The photographer is responsible for specific operational activity or procedure. Questions concerning specific procedures or requirements should be directed to the project manager or FTL.

Note: Some sites do not permit photographic documentation. Check with the site contact for any restrictions.

7.0 References

U. S. Army Corps of Engineers. 2001. *Requirements for the Preparation of Sampling and Analysis Plans*, EM 200-1-3. Appendix F. February.

U. S. Environmental Protection Agency. 1992. National Enforcement Investigations Center. *Multi-Media Investigation Manual*, EPA-330/9-89-003-R. p. 85. Revised March.

_____. Region IV. 2001. *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*. Athens, Georgia. November.